Flow

THE MAGAZINE WHICH INTEGRATES MATERIAL HANDLING EQUIPMENT INTO THE FLOW OF PRODUCTI

THE UNIVERSITY OF TEXAS
JUN 11 1946
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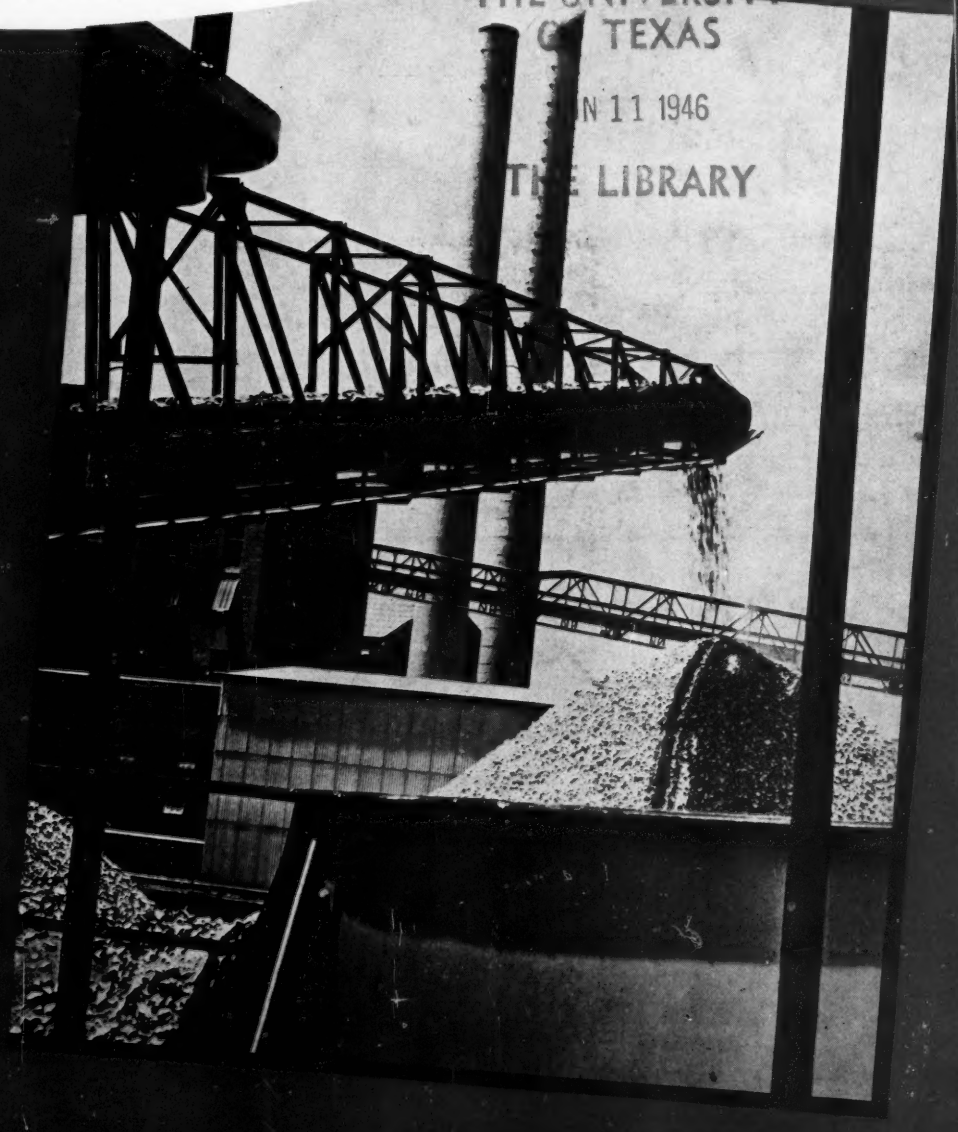
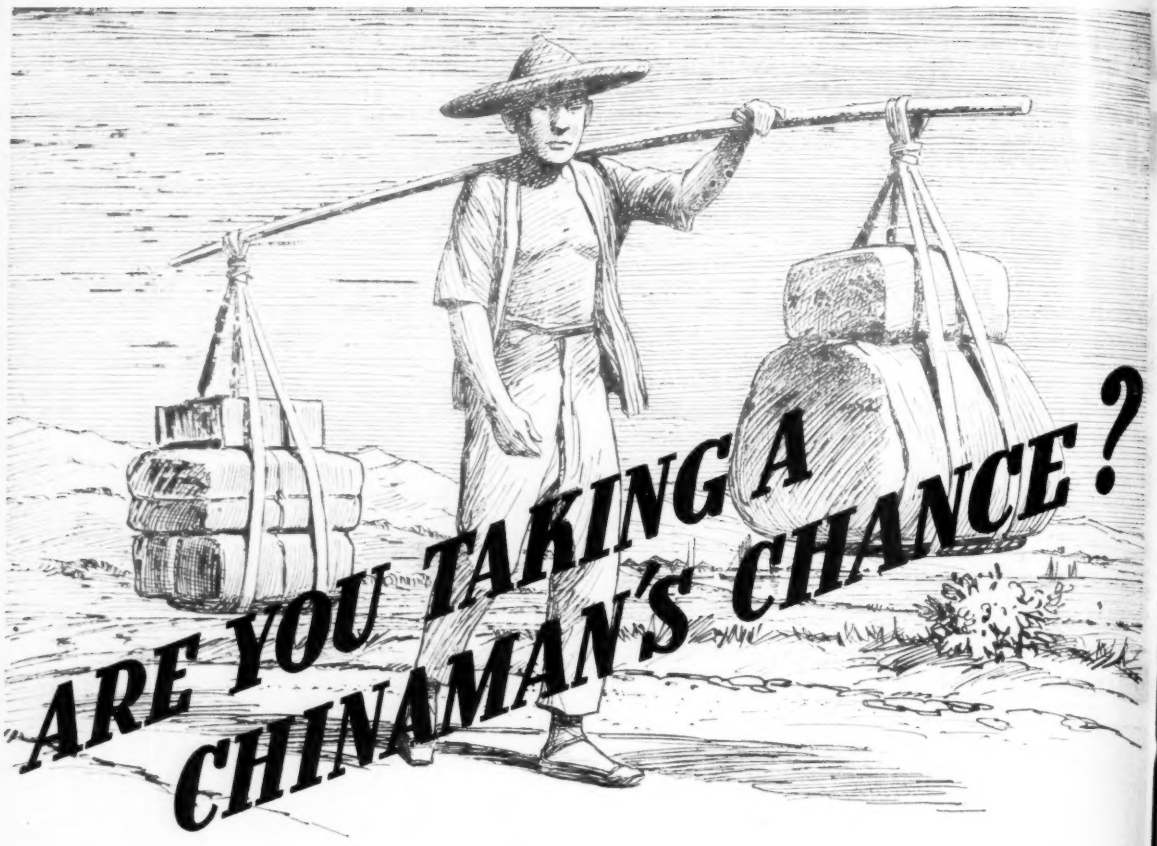


THIS ISSUE: Answer to Cost Control... A Bulk Handling System... What They Sa
Ford Adds Speed to Mass Production... Systemized Storage for Di



Over in China, where human labor is cheap and plentiful, industry can take a chance on man-power as a haulage medium. But it's a 20 to 1 shot that such practice wouldn't pan out in your business!

The Truck-Man has more heft and lugging power than a whole gang of husky he-men. It makes light of heavy loads—2000 lbs. or less. Pussyfoots easily around crowded machines, through doorways and along narrow aisles. Two speeds. Low platform to slide under loaded skids, with a hydraulic lift to raise them. Gasoline power. Easy to operate. Low upkeep. Long lasting.

Ask for descriptive folder.

Limited Open Territory for Substantial Distributors

truck-man

a product of

YARD-MAN INC.

1418 West Ganson, Jackson, Mich.

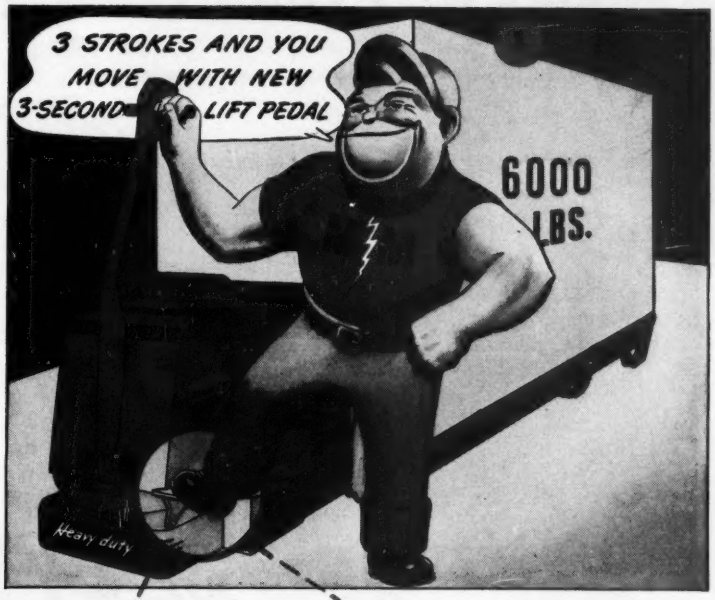
Amazing New Postwar Transporter Lifts Loads Faster... *Moves Loads Easier!*

Adds New Efficiency, Longer Life to Miracle Electric Truck

Yes, you get more—much more in the amazing NEW, POSTWAR TRANSPORTER—the miracle electric truck long famed for cutting handling costs in half and taking the work out of every material moving job.

Astounding new money, time and work saving features have been added. Developments that lift loads faster, move them easier, give longer life and greater efficiency to a unit already noted for energy-saving performance.

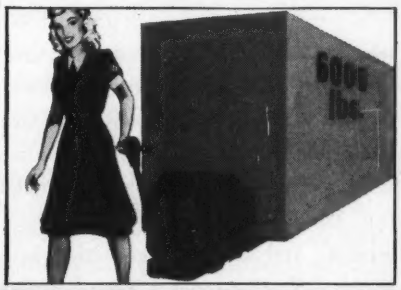
With practically everything new but the hardware, the features below only highlight what you will get in the 1946 Transporter. Send the coupon. Get *all* the facts, before you decide on any motorized hand truck.



YOU MOVE WITH AMAZING "TOUCH-OF-YOUR-THUMB" EASE, *says*..."*MUSCLE MIKE*"

The new 3-second Lift Pedal contains two pistons or cylinders, the high pressure (low speed) cylinder being housed inside the low pressure (high speed) piston. Both cylinders are actuated by the cam when the foot pedal is depressed. One stroke of the foot pedal is all that is required to engage skid.

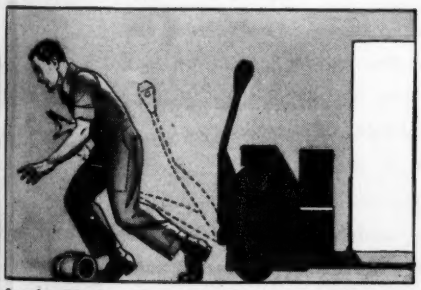
When load resistance is encountered, the fluid from the larger or low pressure cylinder by-passes back into the reservoir, and the high pressure cylinder is employed to raise the load. So the first stroke of the foot pedal engages the load, and two more strokes raise the load sufficiently to move.



EASY TO GET AT POWER UNIT

Changes in design have been made, so that all parts of the power unit are easily accessible. The wiring system has been simplified, and component parts compactly placed where they can be reached easily for lubrication, and inspection.

NEW SAFETY BRAKE



Complete "dead-man" control is assured by a double shoe external contracting type larger diameter brake, which provides four to five times more braking effort. This gives you a Positive Mechanical Brake more efficient and safer the instant control handle is released to upright position.

FOOT PEDAL HINGES BACK FOR SHORTER TURNING RADIUS

To provide a shorter turning radius, the foot pedal is hinged back when not in use for lifting.

- Double-Pitch Reduction Chain Drive Prolongs life of unit.
- New Magnetic Contactor Utilizes Silver Alloy Tips to give ten times more life.
- Carbon Brushes in Commutator Type Collector Ring Replace Copper Fingers to eliminate lubrication, increase wearing quality.

Approved by Underwriters' Laboratories, Inc.

Transporter

Lightens LIFE'S LOADS

AUTOMATIC TRANSPORTATION COMPANY
Div. of The Yale & Towne Mfg. Co.
141 West 87th St., Dept. F, Chicago 20, Illinois

Please mail me without cost or obligation, complete facts about the NEW Postwar TRANSPORTER.
( ) Have an A. T. C. Specialist call and survey my material handling costs.

Company Name.....
By.....Position.....
Street Address.....
City.....State.....

Get full time from your trucks

by "Strategic Spotting" of these G-E BATTERY CHARGERS

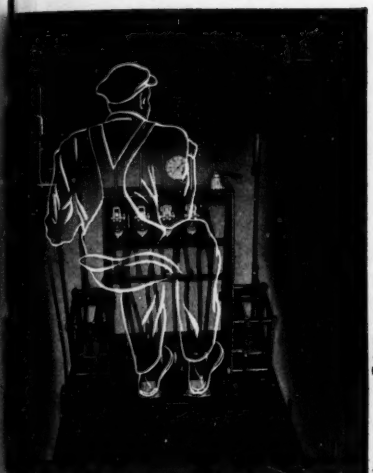
You can be sure of a full day's active work from every one of your industrial trucks by installing G-E copper-oxide chargers right in the areas of use. They require little space, are compact and self-contained. Automatic operation provides easy, fast, economical charging. G-E chargers are right for "strategic area" service. And a local installation is always ready to give batteries a Noon-hour boost to maintain working efficiency.

Entirely automatic, G-E copper-oxide chargers are simple to use. Your driver sets the control and the charger takes over to finish the job, cutting out when charge is complete. There's no danger of overcharging.

G-E copper-oxide chargers for lead-acid batteries, for nickel-alkaline batteries, and for combination use are priced low, and are made in capacities to meet your battery needs. For illustrated booklet and complete information, write General Electric Co., Appliance and Merchandise Dept., Section A-6614-137, Bridgeport, Conn.

GENERAL ELECTRIC

Saves its Cost



OPERATED, TRAVELED AND STEERED FROM THE CRANEMAN'S SEAT

AUTO-TRUCK MOBILITY
ANTI-FRICTION BEARINGS
AIR-OPERATED CLUTCHES
SAFETY HOIST BRAKES
BALANCED WEIGHT RATIO
SIMPLE, POWERFUL DESIGN
RANGE OF SEVEN MODELS

SEND FOR CATALOG No. 73

Air-Controlled

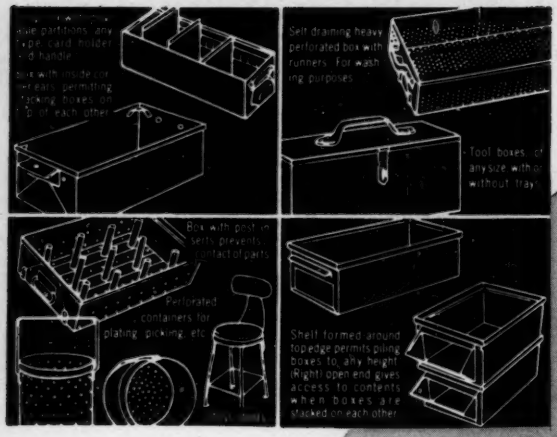
Without fatigue, and all day long, *one man,* with an Aero-Crane, does the work of 4 or 5 men—gets your material onto the stockpile and off again at minimum cost. One man handles those 200 to 1000 lb. loads that otherwise eat up the time of a crew!

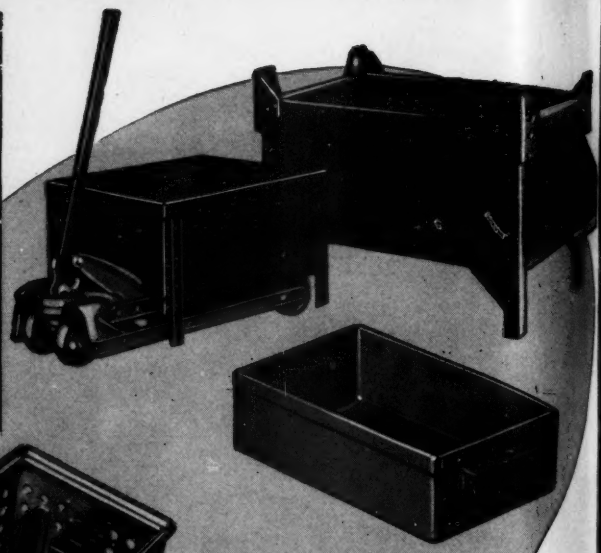
Designed for rapid yard work, the Aero-Crane goes anywhere a truck can go. You can travel it light or loaded with boom in any position. Your craneman needs no helper to steer or operate. Tough-built, with anti-friction bearings throughout, electric welded construction, non-burn clutches, air-controls, Aero-Crane keeps going free of breakdowns—pays for itself in saved man-hours alone!

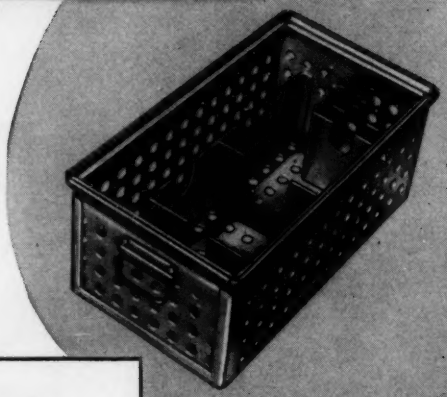
Built in a range of seven models. Capacities of 3,500 to 50,000 lbs. at 12 foot radius. Diesel or gasoline powered.

SENSITIZED

ORTON CRANE & SHOVEL CO.
608 S. DEARBORN ST., CHICAGO 5, ILL.


Self draining heavy perforated box with runners for wash ing purposes
Tool boxes of any size with or without tray
Box with post or sells prevents contact of parts
Perforated containers for plating, picking, etc.
Shelf formed around top edge permits piling boxes to any height (Right) open end gives access to contents when boxes are stacked on each other





Steel Piling Box with fixed or removable partition designed to hold one set of parts needed for any given assembly or sub-assembly. Big time-saver.

Stacking or Piling Box of excellent design, strong and durable. Any size, to suit your needs. Above: Triple Hem Shop Box made with straight or tapered sides

Shop Barrels, any style or size, built for long life and hard service.

Shop Stools with steel, solid wood or laminated wood seats. Sturdy reinforced legs, of any desired height.

Comfortable Back Rests of several different designs, may be had at a slight extra cost.

TO KEEP PRODUCTION *flowing smoothly*

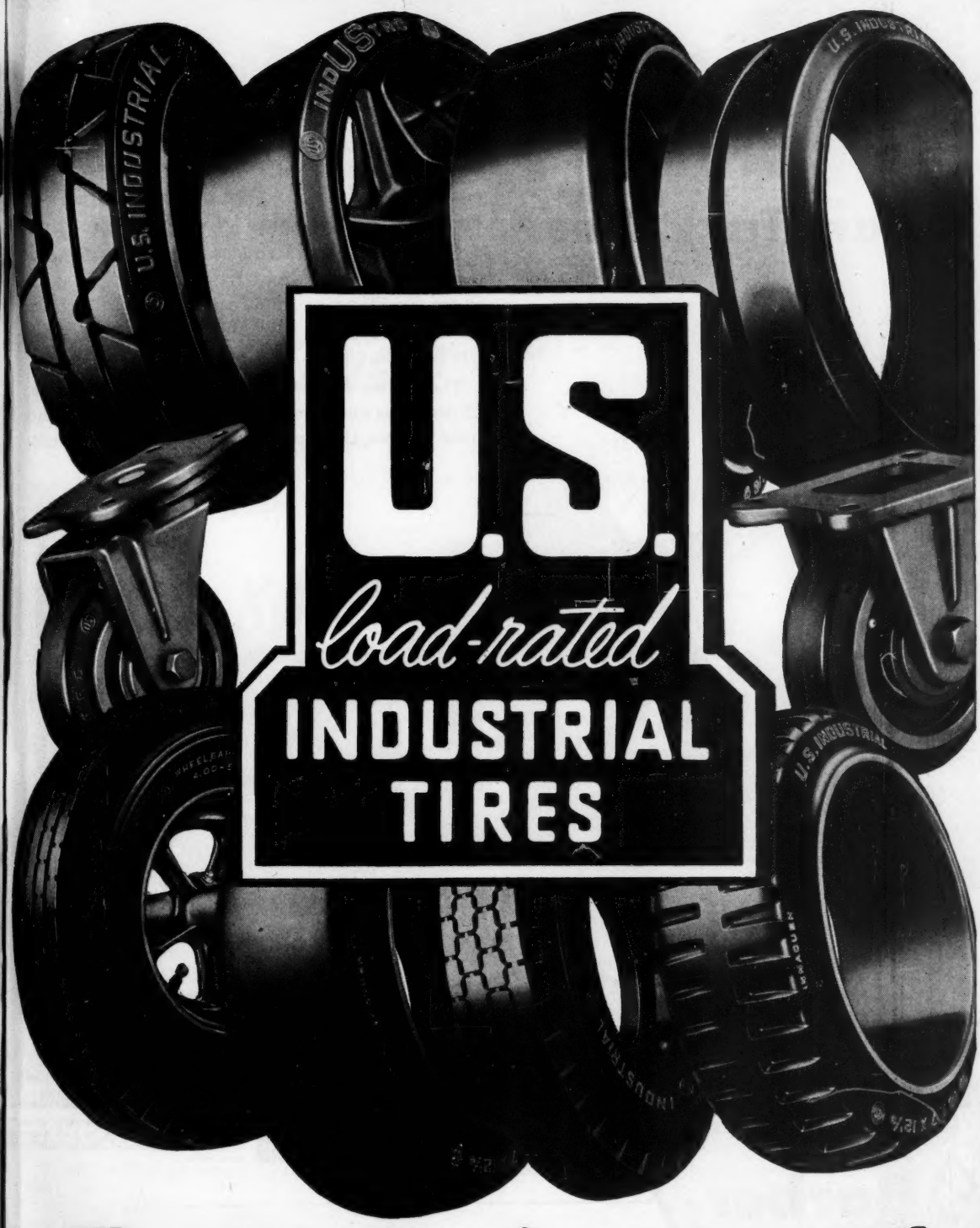
Where small, loose products are used or produced, perfecting the materials handling system is often the most important factor in attaining lower production cost. An essential part of the system is properly designed, light and strong metal shop containers for the pickup, collection, and conveyance of materials to and from machines, finishing, assembly, packaging and storage.

Cleveland shop boxes, barrels, cans, pans and pails are usually custom-made, because the small extra first cost is trifling compared with the advantages gained, year in and year out, by having containers of exactly the right size, shape and design to fit individual needs and special handling requirements.

Catalog, prices, and design service on request, without cost or obligation.

SHOP EQUIPMENT DIVISION
Cleveland Wire Spring Co.
5250 BROOKPARK RD. • CLEVELAND 9, OHIO

Cleveland **STEEL SHOP EQUIPMENT**
CLEVELAND WIRE SPRING CO.
2012 West 25th Street, Cleveland 13, Ohio
Subsidiary—Reynolds Spring Company, Jackson, Mich.



The right Tire for every job!

UNITED STATES RUBBER COMPANY

Serving Through Science

1230 Sixth Avenue · Rockefeller Center · New York 20, N. Y.

How

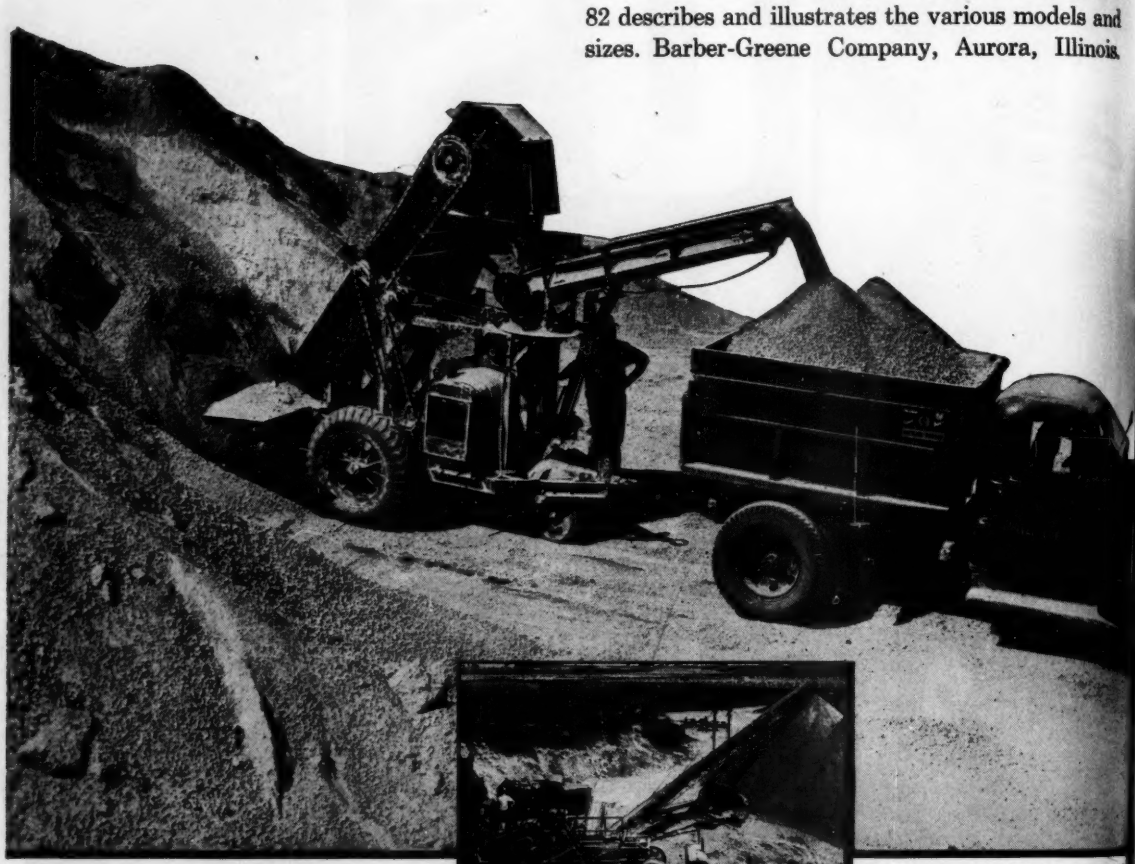
B-G Bucket Loaders

Save Truck Time

• Saving truck loading time is the equivalent of adding trucks to your fleet. And, Barber-Greene Bucket Loaders *are* saving truck time every day through their high capacity and efficiency in loading from stock piles. They're specially designed for this job—a job no other method approaches from the standpoint of saving time.

In addition, Barber-Greene Bucket Loaders are easily maneuvered around the yard or pit, and, where conditions warrant, can be equipped with a special high travel speed for moving from stock pile to stock pile.

The Barber-Greene Bucket Loader Catalog No. 82 describes and illustrates the various models and sizes. Barber-Greene Company, Aurora, Illinois.



This B-G Portable Belt Conveyor provi a flexible storage system for bulk mater . . . builds long parallel piles or large stock piles.

Barber-Greene CONSTANT FLOW EQUIPMENT

LOADERS • PERMANENT CONVEYORS • DITCHERS • PORTABLE CONVEYORS • FINISHERS • BITUMINOUS PLANTS • COAL

It Costs $3.90 to store THESE Crates
LABOR —Two Men, 35 Minutes $1.40
SPACE —50 Square Feet 2.50
$3.90
86¢ for THESE
LABOR —Two Men, 9 Minutes . . . . . $ .36
SPACE —10 Square Feet 50
$ .86

THE ONLY DIFFERENCE IS BARRETT EQUIPMENT! A Barrett Lift-truck enables *one man* to move crates *faster than two.* A *Barrett* Portable Elevator stores them in *one-fifth* the floor *space.* One-fourth the time, one-fifth the floor space—and look at the difference in cost!

Note how the elevator makes full use of air space, leaves floor space clear for productive work. See the saving in heat, light, maintenance. This is the kind of storage which may even save the cost of a new building!

That's why plant owners by the hundreds are turning to this storage team—*Barrett* Lift-trucks and *Barrett* Portable Elevators. They're saving time . . . saving labor . . . boosting storage space by 200%, 300%, even 400%. Any *Barrett* engineer will be glad to show you how it's done—without cost or obligation.

Write today for your free copy of the Barrett Junior Catalog. It's filled with handling tips to save money for you.

BARRETT-CRAVENS COMPANY
3257 West 30th Street • Chicago 23, Illinois

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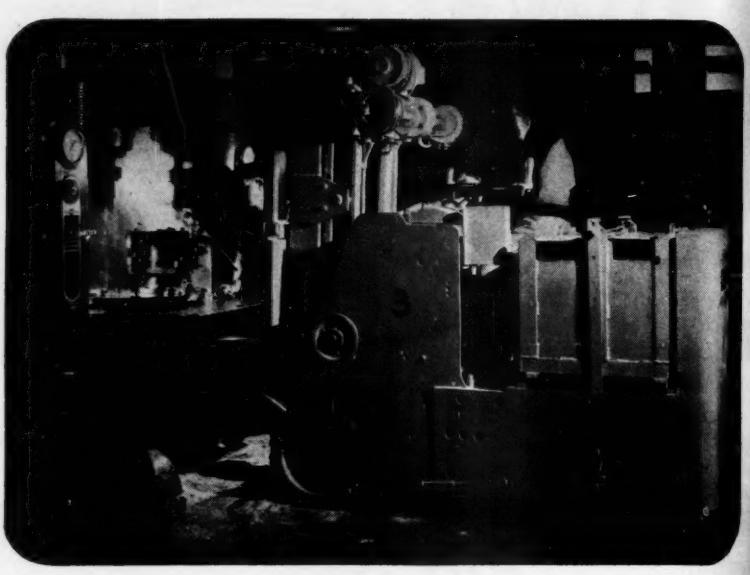
BARRETT

ONE MAN DOES MORE THAN 3 OR 4 . . . WITH A BARRETT

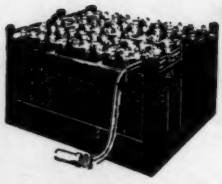
Barrett Handling Equipment

Use BATTERY TRUCKS *for* SPEEDY SET-UPS



Changing the punch on the ram of this press is simplified by use of a fork-lift truck. New developments in handling methods appear regularly in STORAGE BATTERY POWER. Write for a sample copy if you do not already receive it.

...ALKALINE BATTERIES *for 24-HOUR POWER*



In Industrial Trucks, Alkaline Batteries Give You These Important Advantages

- They are **durable mechanically;** grids, containers and other structural parts of the cells are of steel; the alkaline electrolyte is a preservative of steel.
- They can be **charged rapidly;** gassing cannot dislodge the active materials.
- They **withstand temperature extremes;** are free from freezing hazard; are easily ventilated for rapid cooling.
- They are **foolproof electrically;** are not injured by short circuiting, reverse charging or similar accidents.
- They can **stand idle indefinitely** without injury. Merely discharge, short-circuit, and store in a clean, dry place.
- They are **simple and easy to maintain.**

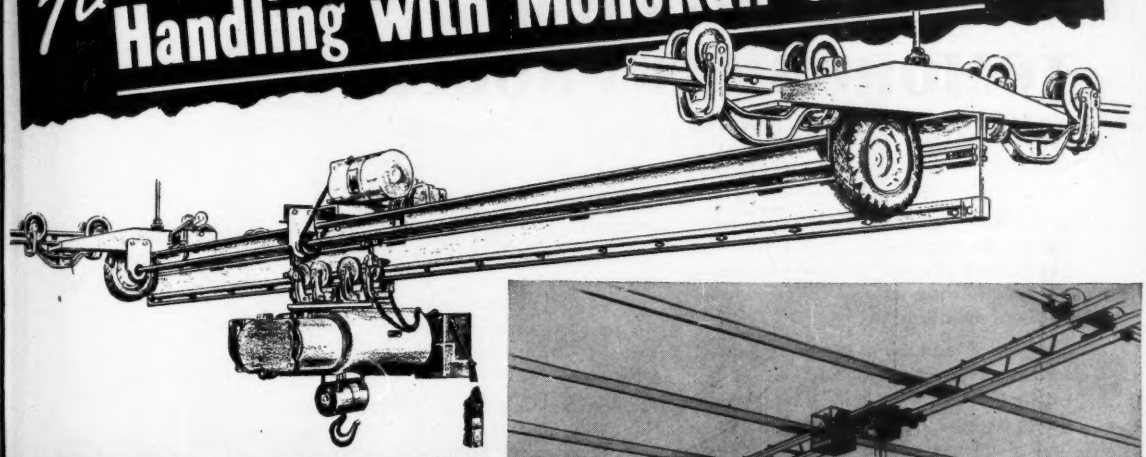
CHANGING large, heavy dies on huge production presses is one of the many handling operations that are being speeded up in numerous plants by means of battery industrial trucks. They enable one man to do the job of several in much less time, thereby increasing production efficiency of the presses. Further economies are effected by using the same trucks for storing idle dies in space-saving tiered racks.

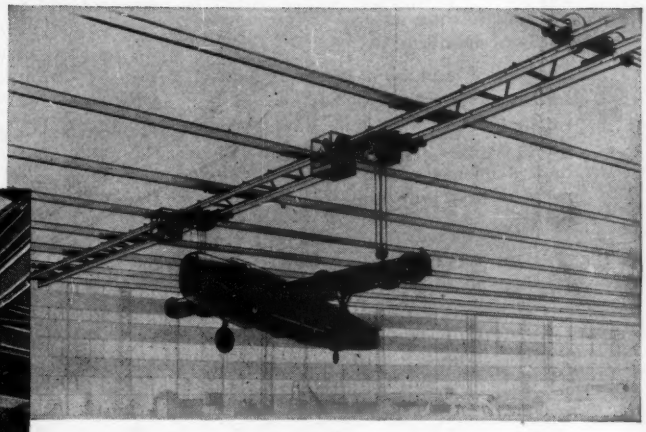
A battery industrial truck has natural advantages for simplifying such handling jobs because of its superior maneuverability, high availability and dependable operation. Exchange batteries keep the truck continuously supplied with power. While one battery operates the truck, another is being charged. Except for the few minutes needed to exchange batteries, the truck need not stop for servicing its power unit. Its electric motor drives have a minimum of wearing parts; are inherently simple and trouble-free. The truck starts instantly; accelerates smoothly; operates quickly; gives off no fumes; consumes no power during stops. Not only does it make efficient use of power but the current used for battery charging is the lowest-cost power available.

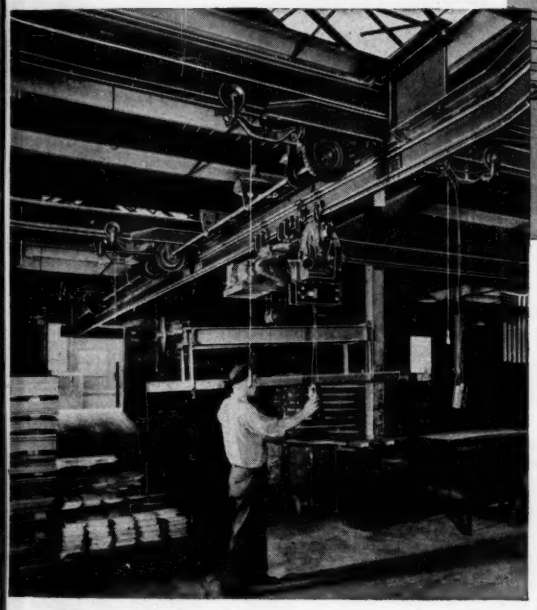
Altogether, the battery industrial truck is one of the most dependable and economical types of handling equipment—especially when powered by Edison Alkaline Batteries. With steel cell construction, a solution that is a preservative of steel, and a fool-proof electrochemical principle of operation, they are the most durable, longest lived and most trouble-free of all batteries. *Edison Storage Battery Division of Thomas A. Edison, Incorporated, West Orange, N. J.*

Edison
ALKALINE BATTERIES

Flexible Handling with MonoRail Cranes



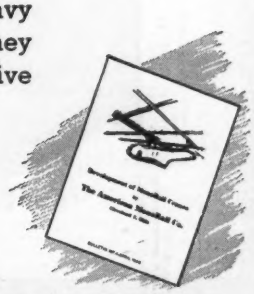




American MonoRail Cranes are not limited to bridging a single span. With their special interlocking and twin bridge designs, they supply over-all coverage. . . . your handling is not tied down to alleyways or spotting or unloading near permanent equipment.

American MonoRail Cranes are available for any type of job — heavy or light duty — full automatic, cab controlled or hand operated. They can be installed under present operating conditions without excessive structural changes.

GET A COPY OF THIS BOOKLET! It tells the complete story of monorail crane development. Learn how cranes have been adapted to all kinds of handling operations. Ask for Bulletin MF-1.



THE AMERICAN **MONORAIL** COMPANY

13129 ATHENS AVENUE — CLEVELAND 7, OHIO

Solving
TOMORROW'S PROBLEMS

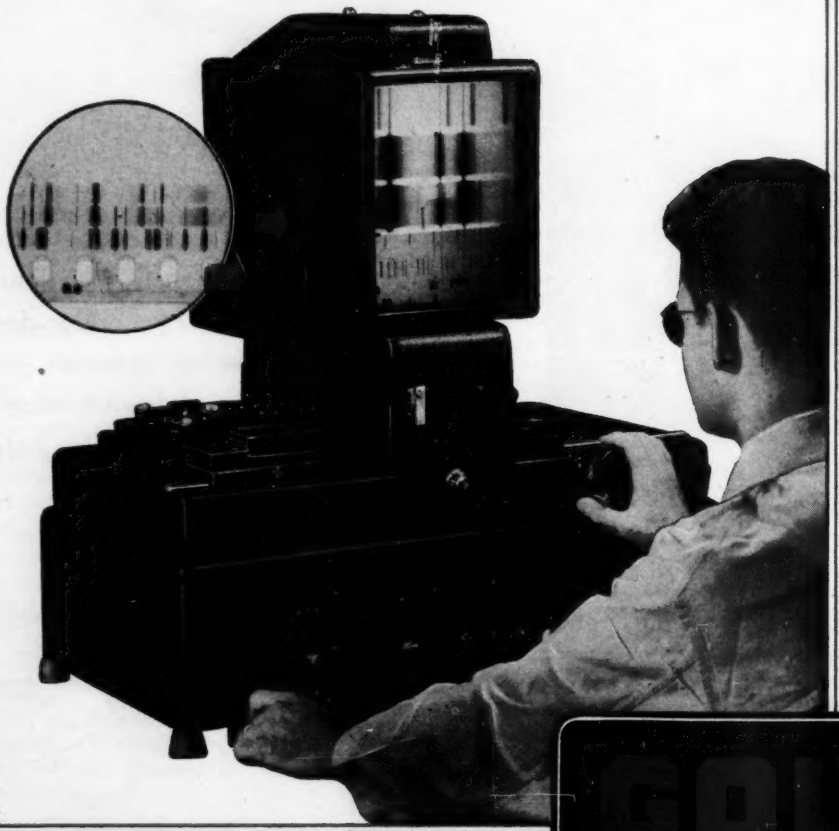
GOULD RESEARCH IS CONSTANT, SO LOOK TO GOULD FOR LEADERSHIP!

In the new Gould research laboratory there is an electric spark that is bringing you better batteries. It is part of a modern spectroscope used to determine the purity of metals.

Samples of lead, burnt in this spark, are spectroscopically photographed and the resulting film inserted in the densitometer shown below. This machine can indentify and accurately measure the presence of less than one thousandth of one per cent of any foreign substance.

These instruments are but two of the many new research tools in use in the Gould laboratory. Under the skilled direction of Gould engineers they are making storage battery construction an exact science.

For further information about this new research laboratory write Dept. 76, Gould Storage Battery Corporation, Depew, New York.



Gould makes storage batteries for
Industrial Trucks and Tractors
Mine Locomotives
Mine Shuttle Cars
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Diesel Locomotives
Railway Car Lighting and Air Conditioning
Railway Signals
and
All Stationary Applications

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MOBILIFT will solve Materials Handling Problems like YOURS

Regardless of what type of plant you operate you'll find Mobilift "fits in" perfectly for efficient, low cost handling. Because of its weight, size and maneuverability, Mobilift is the most adaptable of all lift trucks. It is engineered to handle about 80% of all types of materials—unloading, lifting, hauling and stacking. And best of all you can install Mobilift without disrupting your present operation. Start cutting your costs now with Mobilift.

SALES OFFICES:

34-48 Steinway St., Long Island, N.Y.
2430 South Parkway, Chicago 16, Ill.
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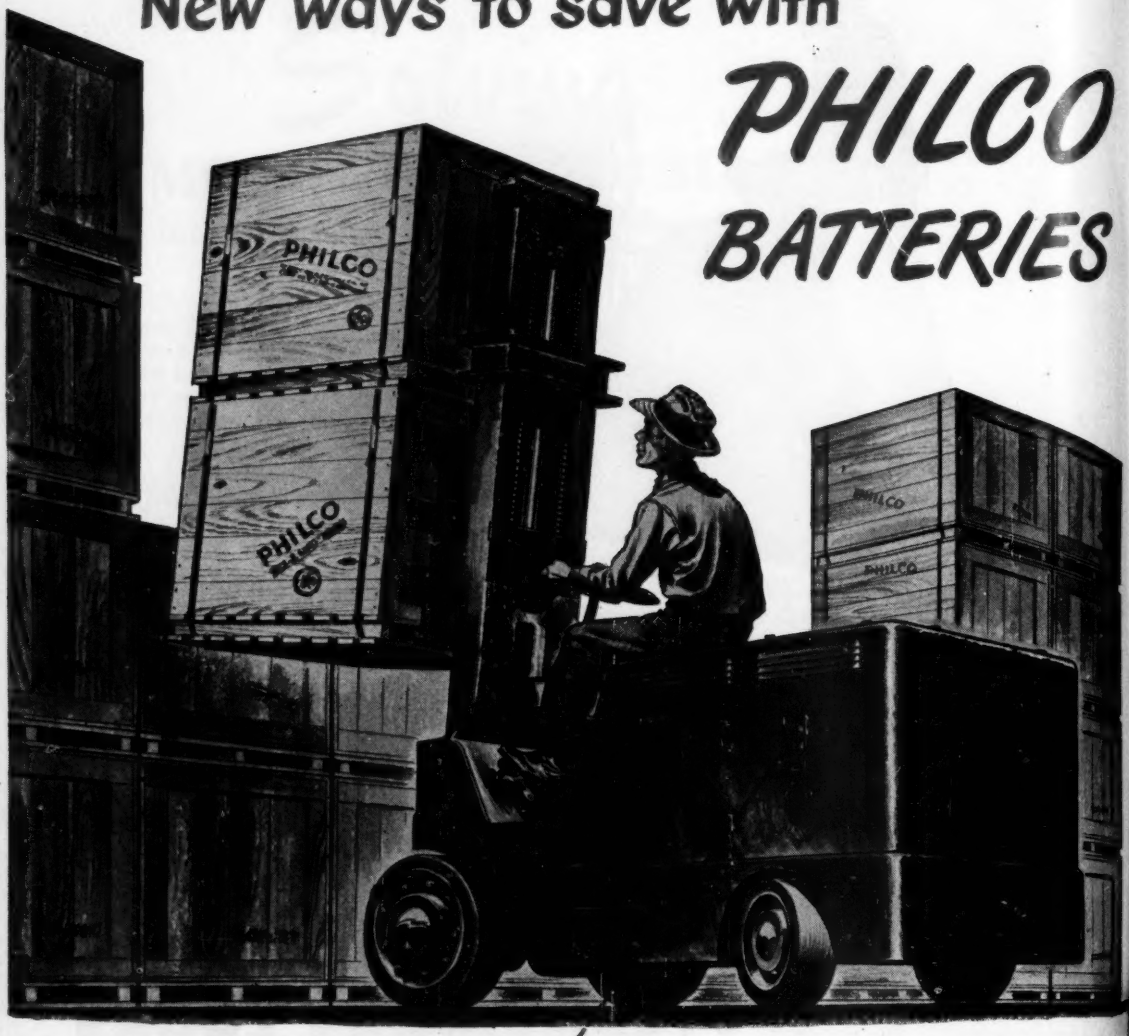
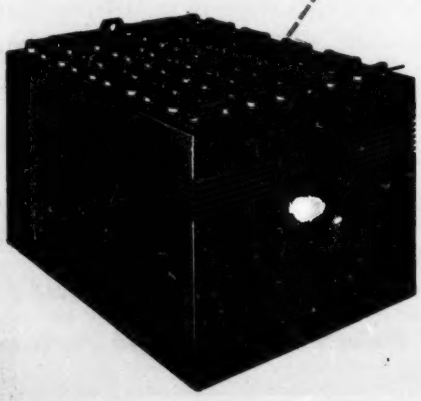
Moves Materials like a Giant!

S. E. Main Street, Portland 14, Oregon

New ways to save with PHILCO BATTERIES



Now you have palletized unit loads, and the new long-life Philco "Thirty" motive power batteries to make modern electric trucks even more useful and economical. The 30% longer life of Philco "Thirty" means substantial savings in battery replacements. Ask for Philco "Thirty" as initial equipment in your new trucks. Specify Philco "Thirty" on battery replacement orders. Write for specification data today. PHILCO CORPORATION, Storage Battery Division, Trenton 7, New Jersey.



PHILCO

FOR 50 YEARS A LEADER IN INDUSTRIAL STORAGE BATTERY DEVELOPMENT

Flow

The magazine which integrates material handling equipment into the flow of production.

Vol. 1, No. 9

JUNE
1946

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FOREIGN SUBSCRIPTIONS—Canada, $3.00 per year, Two years, $5.00; Foreign, $4.00 per year, flat.

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COVER PHOTO—Limestone is being fed by ship's boom to dockside storage bins at the Wyandotte Chemicals Corporation's plant in Wyandotte, Mich. This limestone is moving at a rate better than 1,200 tons per hour from the self-unloading ship. See the article beginning on page 18.

Strips of steel Steel strapped

PALLETIZING makes another money-saving package

A few hundred pounds of bundled steel strip may not be hard to ship loose. But when you have a lot of it, how much easier it is to stack 'em and strap 'em on a pallet and handle as one unit. And how much less handling there is all along the line from shipper to receiver and warehouser. Then multiply this one pallet load by hundreds like it and you have a shipping problem reduced to the lowest denominator. A firmly strapped pallet load prevents the sharp-edged strips from tangling and going on the loose.

You can start saving money right now and in the busy years ahead... in your shipping room time and materials and in freight and handling costs. Find out about the palletizing method of low-cost shipping with Stanley Steel Strapping.

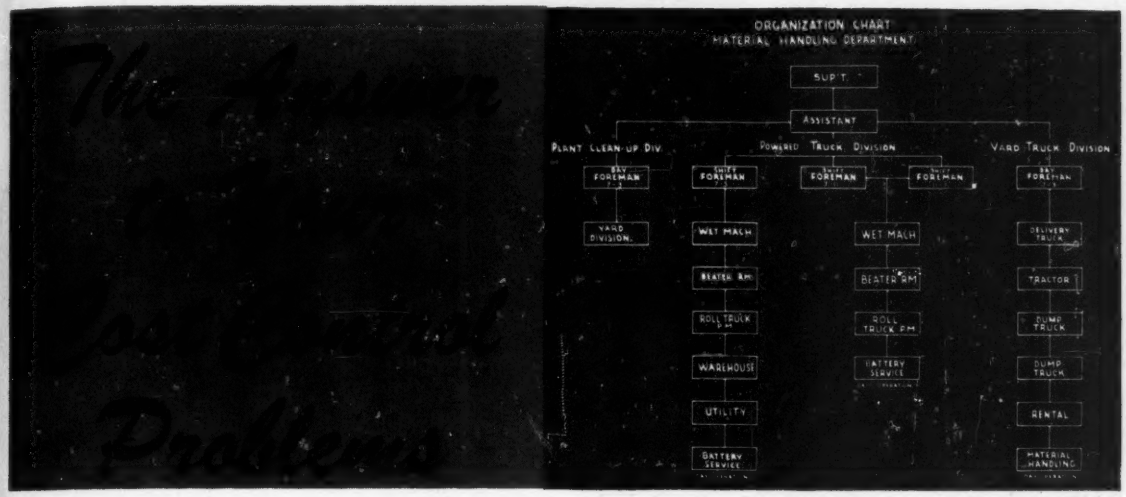
The Stanley Steel Strapping System includes tools, reels and accessories. The Stanley Works, Steel Strapping Division, New Britain, Connecticut.

STANLEY

Trade Mark

STEEL STRAPPING AND CAR BANDING SYSTEMS

a centralized material handling department...

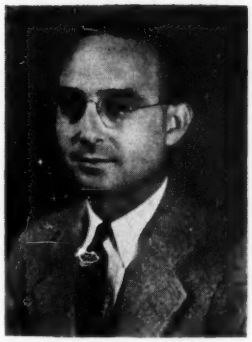


Organization chart of Hammermill's Material Handling Department shows provisions for service to production, service and yard divisions.

IS YOUR mobile material handling equipment utilized to best advantage in the receiving, production, warehousing and shipping departments? Or is one department trying to operate with insufficient equipment while another one has "reserve capacity" that may not be utilized for long periods? Are industrial truck operators properly trained? Supervised? Are materials flowing in the required quantities to the right place at the right time? Are present procedures simply coasting along, using equipment provided some years ago under different operating conditions? Or is a qualified person scrutinizing present operations in order to devise the most economical and efficent carriers or methods in accordance with the needs of today?

Value of Centralized Control

Questions like these may be expected to be resolved satisfactorily through the operation of a centralized material handling department. This has been our experience here at the Hammermill Paper Company. Following a careful and comprehensive survey by our engineering department, the management authorized the inauguration of such a department within the past two years. While its organization and



By A. J. AUBIN

Superintendent
Material Handling and Transportation Department
Hammermill Paper Company, Erie, Pa.

function constitute the main subject of this article, certain relevant aspects of the physical handling will be indicated in passing.

After our program had functioned on a six-month trial basis, a second engineering survey on the results obtained incorporated the following findings: "It requires the full-time service of a qualified person to take care of the details and expedite the material handling program. Without such an individual, the material handling program cannot properly function. Hence all transportation equipment and personnel should be incorporated under one department. This insures full utilization of all equipment and better control of personnel. More materials have been handled with the same amount of equipment. The equipment in general is in better condition. Material handling costs have been reduced. Better service has been rendered the various operating departments, and all the mill department heads have expressed themselves as being satisfied with the service rendered." In other words, *centralization of control has enabled up to render maximum service at minimum cost.* Other specific improvements will be given in a subsequent section of this article.

Since our company manufactures well over 100,000,000 pounds of paper annually, it is apparent that haphazard methods of handling and routing the large tonnage involved would tend to nullify some of the benefits obtainable from modern mechanized methods. And, this applies with equal force to a plant that may turn out not much more than 1,000,000 pounds of finished products in the same time. Experience has shown that centralization of handling operations, intelligently organized, has invariably resulted in impressive savings through operating improvements. (While the smaller plant may not need a complete department, it can neverthe-

less centralize its handling functions under one or more responsible material handlers.)

At present we operate 18 industrial trucks, platform and fork types, including six motorized hand lift trucks. More units are on order to take care of our greater postwar production. Including three battery men, there are 24 operators involved in this phase of the operation, exclusive of foremen. Prior to the creation of the centralized department, these operators used to be on practically every departmental payroll in the mill.

While yard trucking was previously unified under the yard superintendent, many of the orders were directed through the manufacturing division. This at times tended to conflict with proper coordination between in-plant and yard trucking. Consequently yard trucking (it involves only over-the-road vehicles) has likewise been made the responsibility of the centralized material handling department.

Everybody "Keeps It Moving"

Following is an outline of the organization and function of the department. Its head is the superintendent, who reports to the manufacturing superintendent. The duties of the material handling superintendent, who is the writer, are indicated in later paragraphs. As can be seen from the accompanying organization chart, the superintendent works in conjunction with an assistant. The latter is responsible for certain specific functions, presently to be described. Five foremen (one for night operation) and a clerk complete the personnel.

The assistant: He is not only second in charge, but is also responsible for the organization and supervision of the yard transportation system. In this part of our program we are working toward certain improvements, some of which have already been realized.

Deliveries of material for service operations (carpenter shop, construction, repairs, etc.) have been systematized with a regular "service" delivery schedule. Instead of keeping men and material waiting at a location until a truck can be found, the system now operates on definite orders. These are dispatched through the centralized material handling department. Such orders state the kind and quantity of material to be delivered to a specified location at a certain time.

It is proposed to facilitate this part of the program with a call-in system. According to recommendations made, amplifiers and telephone booths are to be installed at suitable locations in the extensive yard area. (Our plant is situated on grounds covering 200 acres.) When a rush order comes in, for example, the call for the trucker will be made through the communication system, locating him immediately. The driver called will then step into the nearest phone booth and call the central office, thus receiving his instructions without delay.

Refuse collections: Since our type of operation covers a good many acres, the collection of refuse is a problem that must be dealt with both from the viewpoint of good housekeeping and efficiency. This is particularly true since several refuse-producing operations are usually in progress in a number of service, repair and construction departments about the plant. Until recently we used high-legged containers, open at the top, for the removal of bark, excavation material, saw dust, iron, lumber and brick scrap, as well as other kinds of refuse. Since the rims of these containers were about six feet off the ground, loading them was difficult when shovelling was necessary, and part of the rubbish was invariably spilled. Or loose material like sawdust was blown by the wind from the open units. (These trays were approximately 8 feet long x 6 feet wide and 2½ feet deep.) When a tray was loaded, a dump-type truck (with no body) backed under the high-legged receptacle, which was then secured to the truck chassis by means of a pin. The truck moved the load to the assigned area for dumping or burning. This type of receptacle was not adaptable to the different kinds of refuse materials handled.

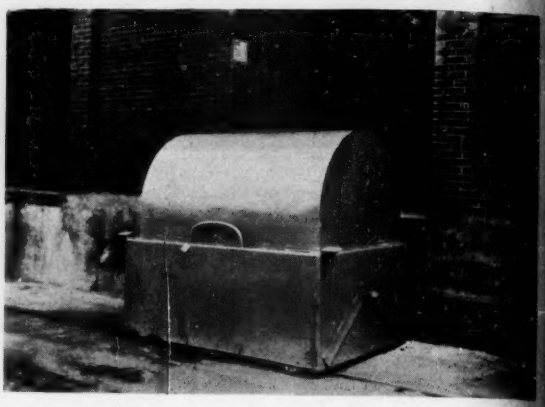


Photo at left shows hoisting truck now in use (pay load: 7,500 lbs.), discharging load of cinders. Arms at side hoist container in position for transport. Vertical carriage is used for dumping. Various containers are similarly handled by truck. Above, loose rubbish box.

Hence we now use specialized containers, of various shapes and capacities, each designed to handle a particular material with least effort and maximum efficiency. 1. A drop-bottom model of two to three cubic-yard capacity for scrap iron and brick. These are an important adjunct to the various service and construction projects going on about the plant. 2. A skip-type body (with a short lip) for handling excavation material. This has a capacity of two cubic yards. 3. A "bulk" type of six cubic-yard capacity (with a closed top) is the efficient container for handling such loose and light materials as saw

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dust (fed from a pipe through a circular opening in the top), and paper scrap. 4. An open type of the same kind, of loading-dock height, is a convenient unit for loading by wheelbarrow from elevated platforms. Bark, wood scrap, etc., are handled in these units.

These specialized containers, it can be seen, are well adapted to the various types of refuse being handled. They are spotted and picked up by a special hoisting truck according to a systematic schedule. The hoisting truck is shown in the photos on these pages. The containers now in use are not only enabling us to do a more efficient job of rubbish collecting, but also serve in a major way in keeping the yard areas neat and clean. This is a point in which we take pride.

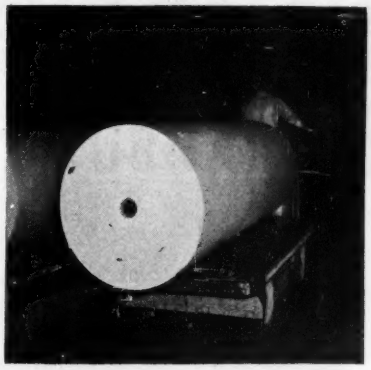
You can see from the foregoing that coordinated yard trucking, systematic service deliveries and the refuse collection system are almost sufficient to keep the assistant busy, besides his other functions as second in charge.

The Foremen's Job

The duties of the day foreman are concerned with all phases of in-plant trucking. He is responsible for the battery charging service and for seeing to it that all equipment is in good repair. Another of his functions will be the training program for industrial truck operators, which is being developed as rapidly as present conditions permit. While inexperienced operators will be properly trained, careless ones will be weeded out and skilful ones properly recognized and encouraged.

An important part of the foreman's duties is, of course, to serve the production departments efficiently. As can be seen from the organization chart, several production departments are listed under the several foremen. These departments use thousands of tons of materials that come in a variety of forms: bagged, roll form, bulk and laps of pulp.

One of the photos, featured as an example of this type of handling, shows how a beater is charged with loose pulp by means of a dump-type skid bin and platform truck with a tilt-type truck bed. This type of operation is saving many handlings that were necessary with the former method. Other materials are similarly moved in large units by means of mechanized methods.



Long roll of paper moving from winders to cutting room. Bed of this platform measures approximately 85"x40".

Material handling orders are recorded in the superintendent's office, where requisitions are issued for transfer of the material. The method of routing and dispatching trucks is determined by the flow of work. Such scheduling assures having trucks available when and where the flow of work demands. By means of this centralized control we are enabled to (1) move materials in accordance with their priority and (2) make the proper charges for cost record purposes. (Previously such costs were hidden in general departmental overhead.

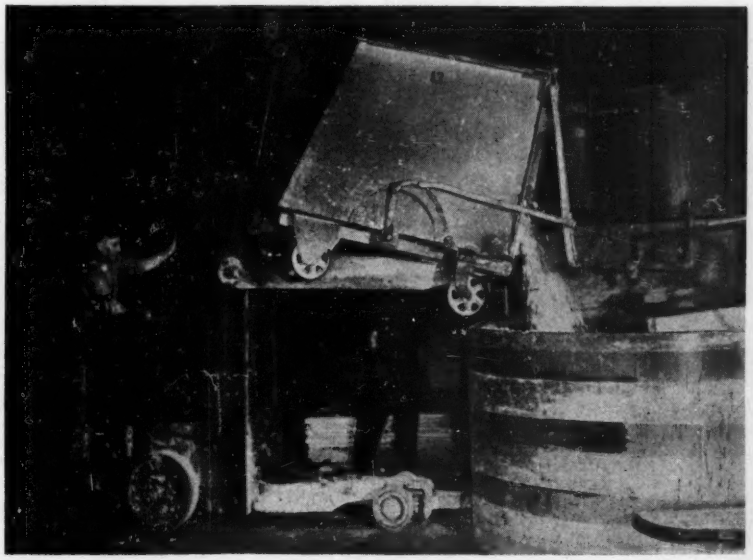
What has just been stated in regard to material needed for production also applies to the handling of finished material. The foreman on each shift is responsible for its movement between the mill division, finishing, warehousing and shipping operations. Under his charge, also, is the storeroom delivery system, which involves the unloading, warehousing and delivery of all packaging materials. Examples are carton flats, wrapping paper, chipboard, fibre board, plywood and sealing materials. Of these a good many carloads are consumed every year.

Incidentally, as a result of a survey and recommendations made by the engineering department, our company has adopted the pallet-and-fork-truck method for handling raw, in-process and finished material wherever the product is adaptable. This phase of the program will be discussed by the writer in a second article in next month's issue.

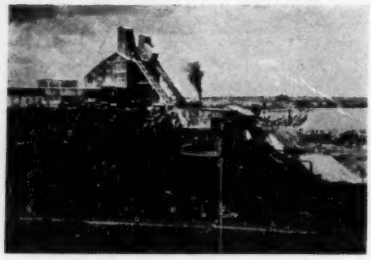
Lastly, the foreman is expected to be alert to new methods and ideas, in cooperation with the department's superintendent. Sometimes a "little trick"—a practical innovation—may save the company many dollars in the handling or loading of a particular product; or such a device may save considerable sums through better product protection. While "improvements" are a major function of the superintendent, every department member is encouraged to constantly

(Turn to page 40)

Interesting handling of bulk pulp. Beater being charged by means of dump-type skid bin and tilt-type platform truck.



A bulk



Five-cubic-yard capacity shovel loads side-dump cars. Smaller photo, right, shows crusher and screen houses. The crusher building is at the lower level.

An Interview With

J. A. LUCIER

Fleet Engineer
Wyandotte Transportation Co.
Wyandotte, Mich.

Electric shovels, side dump cars, skip hoists, self-unloading ships—some of the devices used in this bulk handling operation at Wyandotte Chemicals Corporation

A 5-TON charge of dynamite starts this material handling operation. The blasting site is at the Alpena, Mich., limestone quarry of the Wyandotte Chemicals Corporation, and the destination of the raw material is some 200 miles distant (across Lake Huron) at the company's South Plant in Wyandotte. At every step, whether at the quarry, on board one of the company's four ships, or at the storage bins in Wyandotte, specific handling devices are used in order to move a maximum of the product in minimum time. Among these devices are seagoing conveying systems, built into the ships, which make possible remarkably short turnaround time.

From Quarry to Processing

Our company uses tens of thousands of tons of limestone annually in the manufacture of soda ash and caustic soda, from which literally hundreds of other related chemical products are made for use in industries and homes. Some of the stone screenings are also employed in the manufacture of cement.

A 5-ton charge of dynamite will displace about 30,000 tons of limestone. Usually secondary blasting is done in order to reduce the stone to the required size. The material is then picked up by an electric shovel of five-cubic-yard capacity, which under operating conditions amounts to approximately five tons of stone. The shovel loads the raw material in the type of side dump cars shown in one of the photos. These cars are moved in trains of two units each, which have a combined capacity of 30 tons or more. The cars are electrically propelled by use of motors installed on the chassis and are controlled from the crusher house, eliminating the necessity of any men travelling on the cars.

In the crusher building, installed near the base of the screen house, the loaded cars are tilted and the contents dumped into one of two roll crushers. Skip hoists receive the crushed stone from discharge hoppers, and the loaded hoists are then elevated over the inclined runway (see photo) to the top of the screen house by means of steel cables.

A cable car arrangement is used. Thus one skip is lowered as the other is hoisted, one counterbalancing the other. By use of this arrangement, the power requirements need only be sufficient to overcome friction and the actual weight of the load.

Skip hoists, operating on cable car arrangement, elevate crushed stone 150 ft. to screen house.

Getting Ready for Lake Trip

At the top of the screen house, the stone is discharged into surge (storage) bins, from where it is fed by a steel pan conveyor to rotary screens. These segregate the product into two main sizes, as follows: 1. Flux stone—from three inches to seven inches in size. 2. Macadam—it ranges from powdered material to three inches. Scalpings (oversize material) are returned to the recrusher via another conveyor line.

Flux stone may be delivered to reserve stockpiles built at convenient points along the railroad tracks. From here the supply is usually drawn at the start of the season. This surge capacity is also

handling system . . .

THAT REDUCES TURNAROUND TIME

an insurance against a temporary shovel breakdown.

Macadam stone: This size of screened product may be moved on a belt conveyor from the storage bins directly to hoppers at the adjacent plant of the Huron Portland Cement Company. It may also be loaded by gravity into railroad dump cars for movement to the stockpiles.

Self-Unloading Ships

Speed is of the essence in this operation which requires literally mountains of stone to be transported across Lake Huron to the point of use about 200 miles distant. Too, the transporting operation is limited by the Great Lakes navigation season, which opens April 1 and closes November 30. Hence every ship has built into it an efficient conveying system, making each unit of the fleet self-unloading. But, first, the loading.

At Alpena, the ships are loaded by means of dockside storage bins equipped with retractable belt conveyors. These receive the stone through gravity chutes and discharge it into the holds. As can be seen from one of the photos, the retractable conveyors can be extended over the entire hatch, and their position is so regulated during loading as to maintain the ship on an even keel. Thus, while a fully extended conveyor is discharging on the starboard side, the conveyor beside it might be discharging into the port side of the hold. With conveyor belts operating simultaneously in this way, the 8,000-ton S/S Conneaut can be loaded in little more than three hours.

The haul from Alpena to Wyandotte requires about 20 hours. At the unloading point, the ship's conveyor system goes to work. The hold of each ship, it should be explained, is of hopper construction. At predetermined points along both sides of the hold, discharge gates are located. Through these the material feeds onto a steel pan conveyor, running the full length of the conveyor tunnel on each side of the ship. These apron-type pan conveyors on the S/S Conneaut are over 300 feet long.

In unloading, these conveyors

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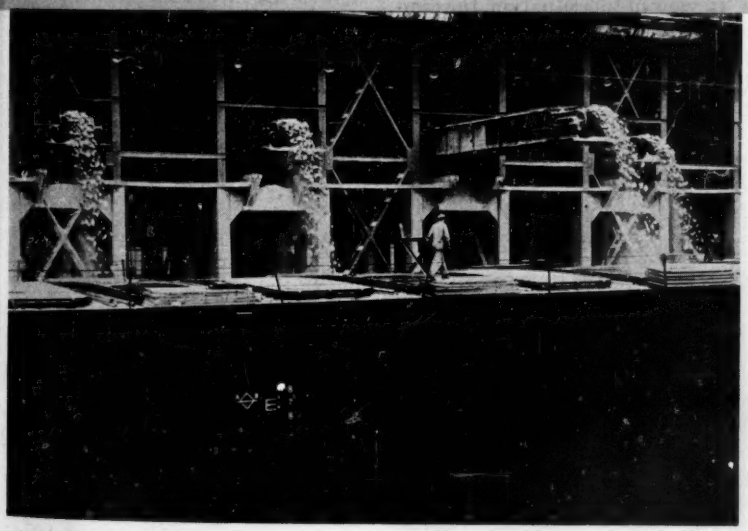
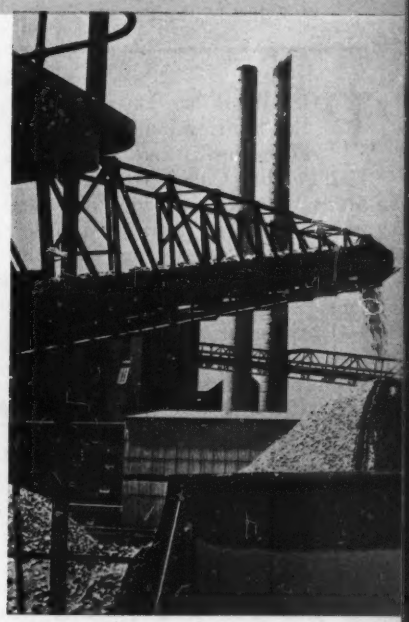
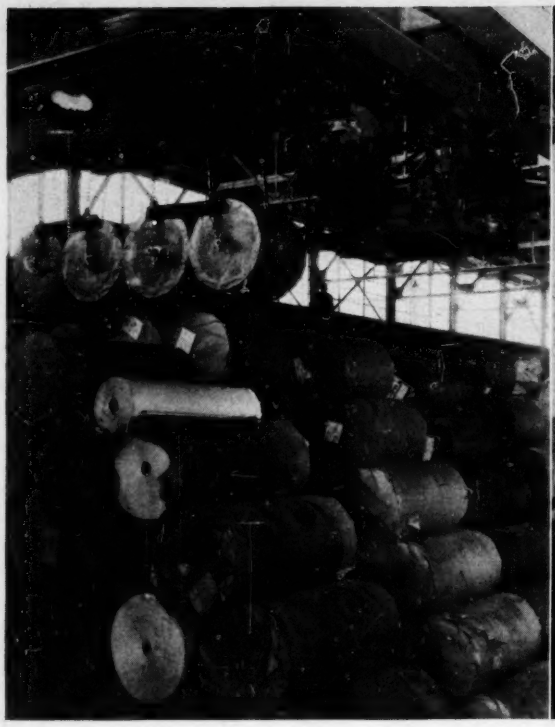
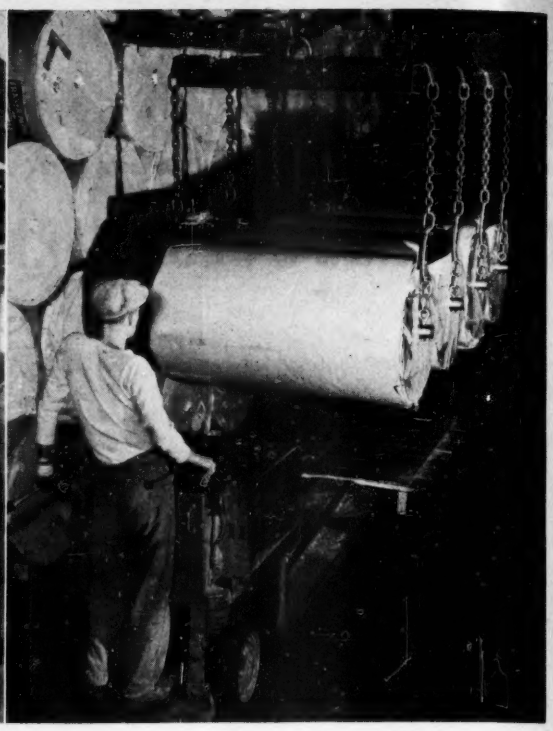
These retractable conveyors load the 8,000-ton S/S Conneaut in three hours, keeping her on even keel.



At rapid rate, ship discharges stone at storage bins in Wyandotte. Underground system removes it.







5-ton crane, left, literally moves mountains of paper between receiving, storage and production operations.

Close-up of the carrier, above. Crane deposits two rolls on truck platform, two rolls on the skid.

STOCK ANSWER

Large and small printers are flooded with orders and trying to cope with above-capacity loads. Mechanical handling speeds warehousing and production operations at this large Chicago printing plant.

By ARTHUR KNOL

Vice President
W. F. Hall Printing Co., Chicago

POSTWAR has loosened upon the printing industry a flood of business, and the W. F. Hall Printing Company is currently attempting to cope with its share of the staggering load. In addition to many periodicals, our company prints a number of catalogs which include those of the country's largest mail order houses. Before the war, the interims between the big catalog runs, each involving millions of units, were the traditional slack periods. Today these periodic slumps no longer exist. Today, new —and steady—business is literally kept waiting to be scheduled between the big runs.

In view of this situation, the power handling of paper and supplies is a vital factor in moving many thousands of tons of material through the plant. Equally important is the fact that power handling is enabling us to make effective use of the cube in storing in-process work as well as supplies. The greater volume handled today naturally makes existing space shrink, and therefore more valuable.

These forms, to be bound in catalogs, are in-process material, here being stacked ceiling high in temporary storage.

Putting the Paper Where It Belongs

The roll paper arrives in freight cars at the siding parallel to the warehouse department. The latter, a part of the plant building, is adjacent to the rail siding on the east and to the press room on the west. The one-floor storage area is approximately 600 feet long and 60 feet wide. A main trucking aisle divides the department into two equal halves, and each half is covered by an overhead traveling crane of 5-ton capacity. The stockpiles of roll paper are built in the eastern half of the building, immediately adjoining the rail siding, while the other half is used for skidded flat

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THIS OR THIS

Generalift

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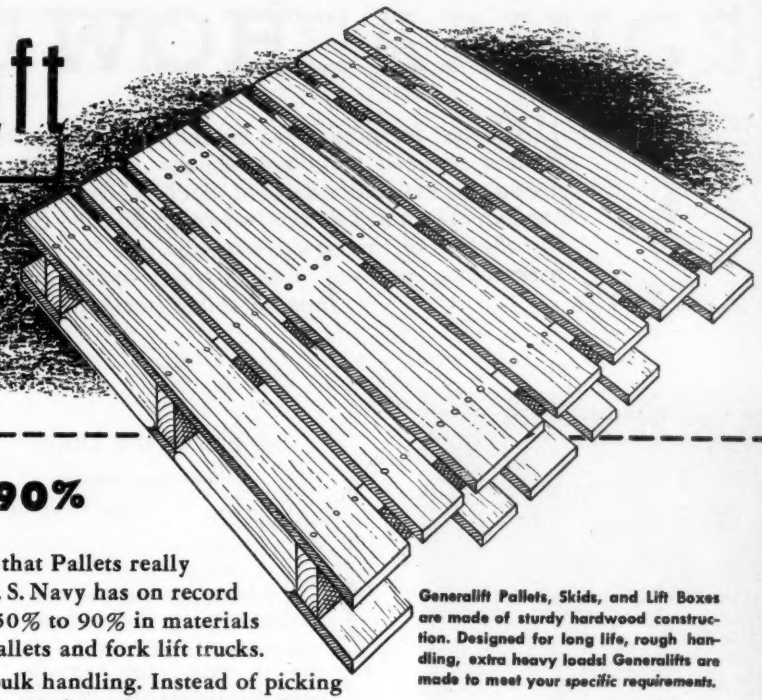
Pallets



SAVE 50% TO 90%

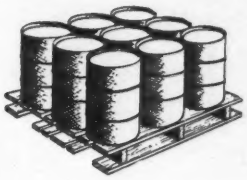
• It was during the war years that Pallets really came into broad usage. The U. S. Navy has on record many examples of savings of 50% to 90% in materials handling through the use of pallets and fork lift trucks.

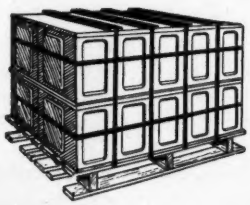
Palletized handling means bulk handling. Instead of picking it up and laying it down, moving it from department to department—"the old bucket brigade"—many items can be consolidated into single loads and moved as one.

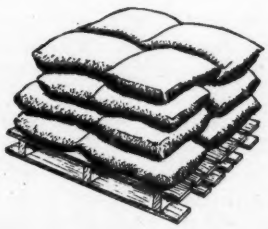
Result: one workman and fork lift truck do the work of many—and do it *better.* Better because it is done more quickly, more efficiently, more economically!

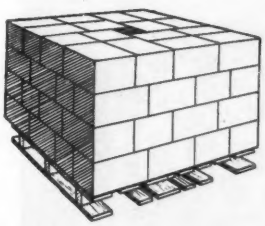
Better because packaging materials are saved, man-hours reduced, and pilferage is discouraged. Furthermore, warehousing and the taking of inventory is simplified (count pallets instead of each item).

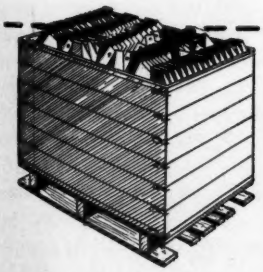
Generalift Pallets, Skids, and Lift Boxes are made of sturdy hardwood construction. Designed for long life, rough handling, extra heavy loads! Generalifts are made to meet your *specific requirements.*











ALL TYPES OF ENGINEERED SHIPPING CONTAINERS

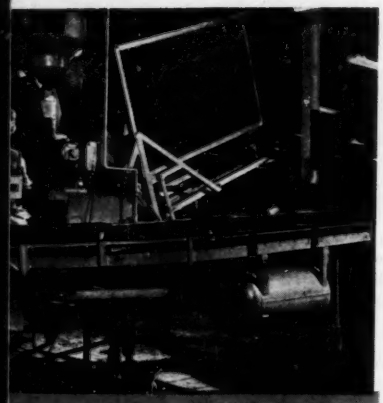
GENERAL BOX COMPANY

GENERAL OFFICES: **60 West Illinois St., Chicago 10, Illinois**
DISTRICT OFFICES AND PLANTS: **Brooklyn, Cincinnati, Detroit, East St. Louis, Kansas City, Louisville, Milwaukee, New Orleans, Sheboygan, Winchendon. Continental Box Company, Inc.: Houston, Dallas.**

ECONOMIZE . . . PALLETIZE . . . GENERALIZE!

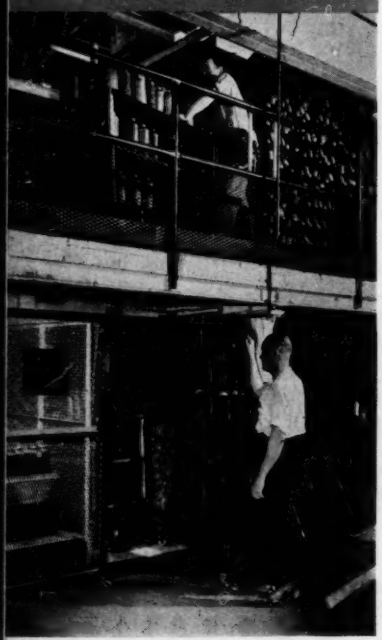
HOW *Timken*

This layout for productive equipment and mechanical handling devices reduced handling because of a shorter travel of work over a succession of adjacent machines or work stations. In 1944 the main plant of The Timken Roller Bearing Company began the installation of this new production line for cleaning, inspection, assembling, packing and shipping operations for automotive tapered roller bearings.



of No. 6 assembly machine, showing in elevated position and cone supply conveyor line, front.

of roll can storage dock, showing truck and part of cage truck storage area.



By KENNETH R. ADAIR and C. W. AUSTIN
Assistant Superintendent Engineer
Timken Roller Bearing Co., Canton, O.

THE automotive tapered roller bearing consists of four parts: the cone, or inner race way; the cup, or outer race way; the rolls; and a stamped steel cage for spacing the rolls in position. The cup or outer race way is generally shipped separately.

Production requirements (120,000 bearings per day), multiplicity of sizes, number of pieces involved, production rates and costs, labor and space available and quick and easy supply of component parts at assembly points, were some of the factors involved in the engineering study. Machines available and their proper allocation to production requirements were carefully considered. Manufacturing methods were in some instances simplified and wherever possible operations were combined to provide a smooth uninterrupted flow of the product. As a consequence of this preliminary study the flow of the product is halted only twice in the entire system.

The first halt occurs in the segregation area, at the beginning of the line, where the material is delivered from the cup and cone grinding room in small lots of random part numbers, by means of caster-mounted hand trucks.

The material, completely finished and ready for the various line operations, is delivered in wire baskets to the segregation area where it is separated into part number lots. The object is to obtain sufficient quantities of any one part number to warrant movement to the inspection lines. Thirty-day requirements for cups and cones include several million pieces, and for this reason the efficient operation of the lines depends upon this segregation. No part number leaves this area until the quantity available is such as to insure profitable processing on the lines. When this condition is met, baskets of cups and cones in two separate lines pass through a preliminary water washing, solvent cleaning, drying and cooling operation and are then discharged ready for further processing onto conveyors which move the material to its proper initial operation.

Features That Lighten the Work

The operations involved on these lines are light manufacturing processes, and 95% of the operators are female. The state laws of Ohio, where the plant is located, are very stringent in the limitations set on repetitive operations done by female employees. Partly for this reason and partly for efficient application of energy, certain features have been incorporated to facilitate the movement of material by these employees. Caster tables (inverted casters mounted on steel plates)

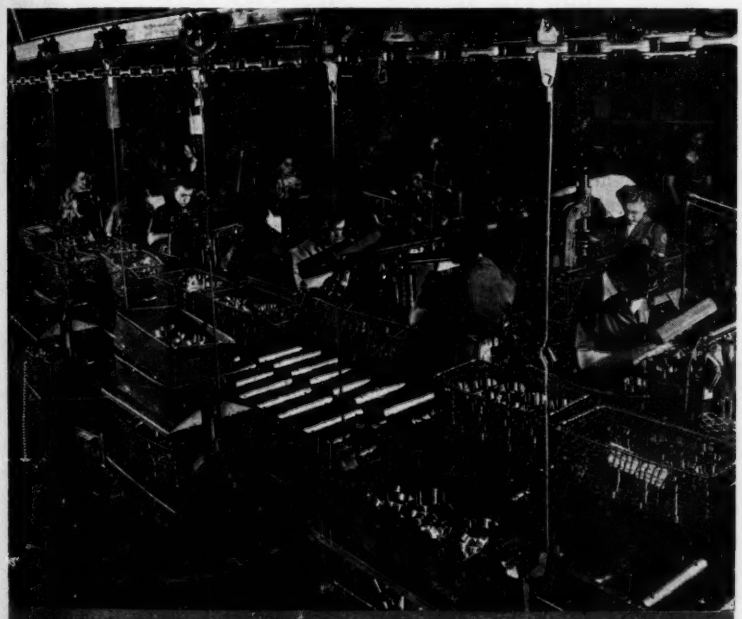
KEEPS THE BEARINGS . . . *Rolling* . . .

PART I.

solve some heavy handling problems. Hydraulic lifts are made to do other positioning and handling tasks. Roller tables and rollered loading devices (air operated by manually controlled valves) assist operators in placing heavily loaded boxes onto chain conveyors. Gravity roller, live roller, belt, slat and chain conveyors play parts in moving the material, their selection being dictated by maintenance factors, loads, processes and methods of putting the work onto or discharging it from the conveyors.

Air operated, electrically controlled gates and switches prevent accidents or congestion at critical points; vertical rollers help move boxes around corners, and photoelectric cells are used to assist or control operator movements and conveyor operations.

Movements of operators to, from, or at work are facilitated by plating conveyors between rollers to permit safe foot traffic over the carrying surfaces. Pits have been installed at points where the height of working conveyors above the



Overhead chain conveyor with double-deck carriers, two-lane supply conveyor tables, pan troughs.

First position of box at cup packing h
Note air-operated rollers between drag c

Second position of box at cup packing b
The operator has placed box above c

floor would have required a stooped or cramped position when working at floor level.

The factory buildings are of one-floor, saw-tooth steel construction. At two points it was found desirable to install mezzanine decks for storage of parts and supplies in order that these items could easily be brought into the lines at the proper places with the least effort.

One such mezzanine area is used for storage of tapered rolls in cans. This deck is located above and adjacent to the assembly area. The stock for this storage is received on live flat skids by fork lift industrial trucks. The skids are lifted to the mezzanine deck by a hydraulic elevator. Roll cans are distributed from these skids to inclined steel racks so that all cans are in view with their identification tags exposed. Syntron vibrating chutes deliver the rolls from hoppers mounted on the elevated deck to the assembly machines on the floor below. An intercommunication system controls the supply of rolls to the machines. The area below the roll storage mezzanine is used for the storage of cage parts in expanded metal cage trucks. This cage storage area is adjacent to the finishing operation in the manufacture of the cages and the problem of supply from the cage department to the storage area is a matter of moving these wheeled trucks only a few feet.

A second mezzanine deck is provided above the packaging machines for the purpose of supplying these machines with waxed papers, tubes, boxes, etc.

Two-Tray Pendant Carriers

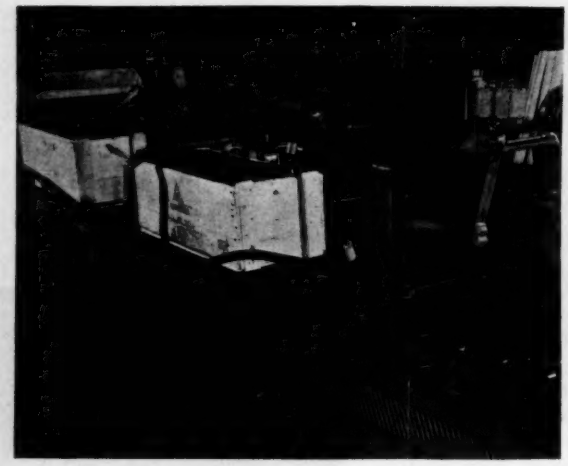
As noted, the larger proportion of cups or outer raceway items are shipped separately; they are therefore handled as individual or complete pieces. From the segregation, cleaning and cooling equipment, cups in baskets are discharged onto a live roller conveyor alongside which are positioned student inspector benches. Any work taken from this conveyor to the student benches is returned to this conveyor to go to the regular cup inspection line. Near the discharge end of this live roller conveyor the baskets of cups are moved by air operated, electrically controlled means to the upper trays of the carriers of the cup inspection line.

Mechanically, the cup inspection line consists of an endless single chain overhead monoveyor, equipped at approximately six-foot centers with two-tray pendant work carriers, a two-lane roller table placed so that the upper trays of the carriers move adjacent to one side of the table and slightly above the rollers. Twenty-four inclined stationary basket troughs are positioned on the opposite side of the roller table, in such a position that a basket pulled from the table onto the trough is at an angle that makes the work easily accessible. Double faced tables for visual inspectors are placed beside these troughs, the inspectors facing each other and working out of the baskets which are in the trough.

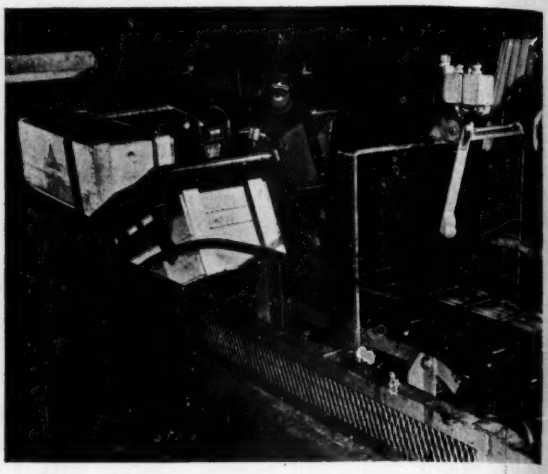
L-shaped roller conveyors are used to carry work from the inspection tables to one end of L-shaped tables. The other ends of these tables are provided with low roller conveyor tables for carrying baskets into which the finish inspected cups are put. These latter roller tables lie adjacent to the returning loop of the overhead monoveyor with their rollers positioned slightly above the lower tray of the pendant carriers. Each lower tray is provided with a down-turned flange which enters a guide on the low conveyor tables so that a basket of work on the latter may be pushed onto the tray without causing lateral swinging of the tray. Each of the 24 inspection groups consists therefore of one basket trough, one double faced table seating two visual inspectors, an L-shaped table providing working space for a taper gauging operator and an outside diameter gauging operator, and small roller conveyors and tables for moving the work in the group and on to the monoveyor when finished. Four bar hooks on each tray carrier provide means for removing rejected material from the line. All uninspected work comes to the cup line on the upper tray, all OK material leaves the line on the lower tray, and all rejected work is wired into groups and placed on the carrier hooks.

No basket of work is permitted to complete a revolution on the monoveyor. Attendants, moving

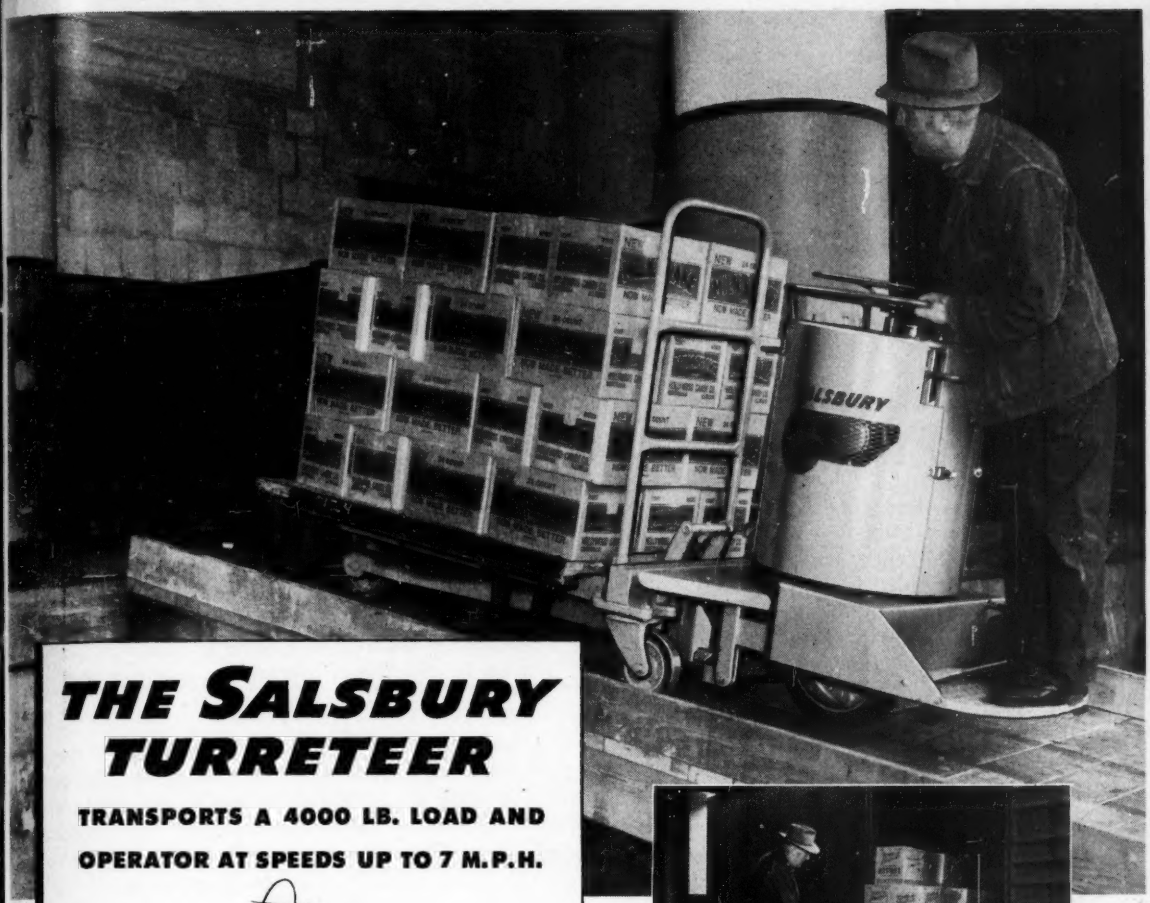
(Turn to page 56)



Box of cups shown traveling over electro-pneumatic gate to the nailing station conveyor line.



This photo shows electro-pneumatic gate in lifted position to route cone box to nailing station.



THE SALSBURY TURRETEER

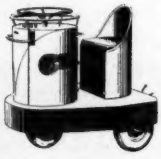
TRANSPORTS A 4000 LB. LOAD AND OPERATOR AT SPEEDS UP TO 7 M.P.H.

The SALSBURY TURRETEER (Platform Type)

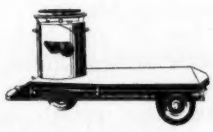
Negotiates steep ramps, saves reversing time – with the rotating turret, the drive wheel can be kept in constant motion.

Exclusive type of articulation, found only in the Salsbury, assures unusual load stability. Carries the operator with the load.

This new high in maneuverability and stability means speed with safety in picking up, transporting and spotting loads.

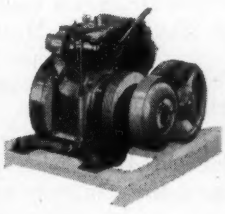


The Salsbury Turretug



The Salsbury Turretruck

Handles easily in tight spots—narrow aisles, in and out of cars or trucks. Rugged and powerful. 4000 lb. capacity. 3" hydraulic lift.



Salsbury Power Package eliminates battery problems

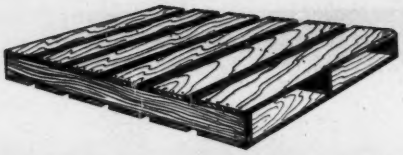
6 *hp gasoline engine* – rugged, compact, efficient. *Automatic transmission* – no gear shifting. *Automatic clutch*–no clutch lever.

Throttle and brake are only controls. Clutch engages smoothly as engine speeds up. Automatic transmission provides exact amount of power as needed.

More detailed information on Salsbury material handling equipment is yours for the asking.
Write for Bulletin 4620-7

SALSBURY MOTORS, INC.

1201 Lexington, Pomona, California • *A subsidiary of Northrop Aircraft, Inc.*

ON THE  PALLET

NEWS · VIEWS · TRENDS

CONDENSATIONS of addresses before recent Industrial Packaging Expositions are featured on page 29 of this issue. Excerpts from additional talks will be given in next month's issue.

THE Acme Steel Company of Chicago announces the purchase of the entire stitching machine division from Harris-Seybold-Potter Company of Cleveland and Dayton, Ohio. The latter will continue to manufacture wire stitching machines and parts until April 30th, 1946, and will continue to service Morrison equipment until arrangements have been completed for Acme Steel to absorb the Morrison service system.

IN a recent address before the Chicago Production Show, K. W. Frase, material handling and project engineer, pointed out that material handling accounts for an average of 22 per cent of the pay roll in all American industry, the largest single labor cost. He stated that Naval studies also showed that material handling operations consume from 60 to 70 per cent of the production time, as compared with only 30 to 40 per cent for actual fabrication.

Mr. Frase urged industrialists to recognize material handling as a specialist's field. "Material handling and the scientific planning of the flow of materials through the plant has become a profession," he declared. He asked management to "study your materials handling problems by assigning a full-time manager to do the job, who knows your business requirements and screens your handling problems for greater speed of operation and lower handling costs."

(See the article in this issue on the Hammermill Company's centralized material handling department. —Ed.)

HANDLING of passengers from incoming to outgoing planes has presented varied problems because many of the planes are reconverted war models with different loading heights. The Glenn L. Martin Company has developed ground handling equipment for use with practically any type of transport plane. This equipment is an adjustable passenger ramp. It can be varied between 11 and 16 steps. During night operations, the steps are illuminated by lights installed in the lower sections of the handrails and step guards.

A NEW type of high-speed door-to-door air freight service, at rates approximately 50 per cent below present air express rates, will be offered by Northwest Airlines and the Railway Express Agency beginning June 1. The new service is expected to speed up delivery of heavy goods to several thousand cities in the northern tier of states across the nation. The service will be the first coordinated air and rail service in the freight field. Rates are based on 30.7 cents per ton mile, covering shipments of 100 pounds or more.

IN handling metals from raw material to the finished product stage, manufacturers have sought a solution to the rust problem for many years. Calgon, Inc., has just announced a new rustproofing technique for steel and galvanized steel.

The basis of this new chemical process is a flexible, glassy metal phosphate coating, so plastic that it will bend with the steel or permit die-stamping without harm to the coating. According to reports, it can be put on by the spray, immersion, or brush methods. And it is said not to require any heat.

ACCORDING to a recent survey made by the Electric Industrial Truck Association, four of the six existing types of electric industrial trucks have been preferred over all other designs in one or more of the past 32 years.

The fork truck is the newcomer to all-star rank. This type came into the picture toward the close of World War I, captured from five to 10 per cent of sales quickly and held that position until 1930. A strong upward trend in popularity that passed 30 per cent was experienced in 1938, and reached 50 to 60 per cent in 1943-44. This growth is directly related to the wartime need of vertical storing and conserving space in railroad cars, and to the phenomenal part played by pallets in both of these operations.

Low-lift platform trucks also won a speedy foothold in many industries, soaring from five per cent in 1913 to about one third of all purchases five years later. Low-lift designs accounted for half of all new acquisitions in many of the years between 1928 and 1935, then declined to 30 per cent in 1940 and to about 15 per cent in 1944.

Low-lift and high-lift designs remain the choice where vertical storing is relatively unimportant and dunnage can be used. Industrial engineers have found that these models can raise, transport and deposit more payload per pound of truck than the fork truck. Moreover, they can function in narrower aisles than fork trucks of equivalent capacity.

THE development of new materials, applications, and techniques in the packaging field, rather than the introduction of new types of containers, is revolutionizing this industry.

Paper, transparent films, metal foils, and combinations of the three have been developed to the point

(Turn to page 63)

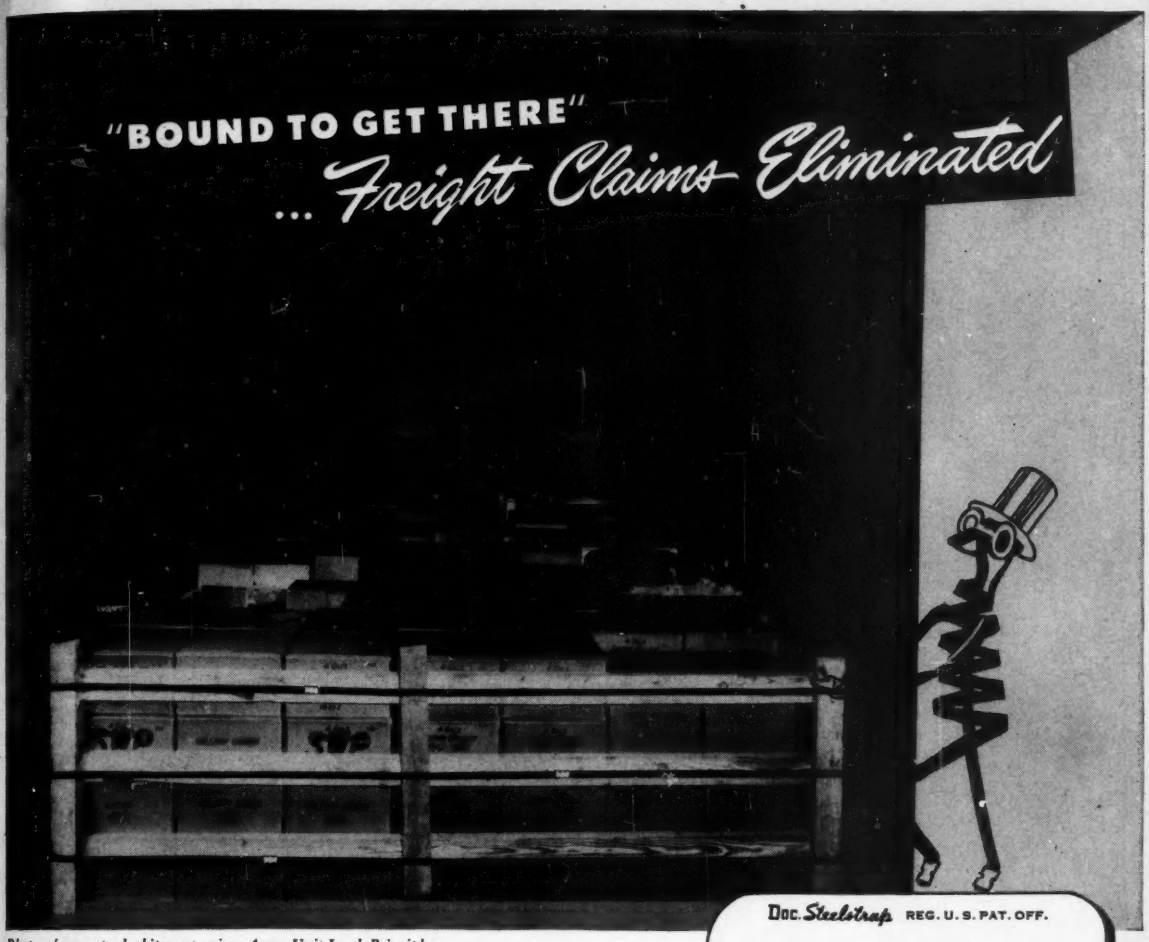


Photo of an actual shipment using Acme Unit-Load Principle.

by ACME *Unit-Load Method*

Damaged goods and profit-draining freight claims are a rarity when carload shipments travel the Acme Unit-Load way.

For Acme Unit-Load secures, protects, and braces cargoes in the grip of strong steel bands . . . assuring safe delivery at every point along the shipping line.

And, customers merely snip the bands to unload a damage-free car with a minimum of time and effort.

So, use Acme Unit-Load Band and methods for bracing, stowing your carload shipments. Then watch freight claims vanish, customer good will increase. Investigate now.

Doc. *Steelstrap* REG. U. S. PAT. OFF.

HOW A CONTAINER MANUFACTURER CUT FREIGHT CLAIMS

This actual case history offers proof. In shipping over 6,000 carloads of 55-gallon steel drums and pails by the Acme Unit-Load Method, damage claims dropped to a mere 3.7% a year. In addition, 80 board feet less lumber was used in each car representing a cash saving of $6.00 per car!

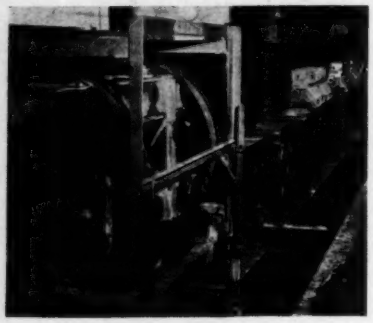
NEW YORK 17 ATLANTA CHICAGO 8 LOS ANGELES 11

ACME STEEL COMPANY

ACME STEEL CO. CHICAGO

RUBBER DISCS REMOVE CHIP

A CHIP conveyor, affording maximum flexibility and employing for the first time in the automotive industry the use of abrasive resisting synthetic rubber, has



Chips drop through floor grating. Absence of chip piles permits closer grouping of machines.

recently been installed by the Packard Motor Car Company.

Constructed in conjunction with company engineers, the new-type conveyor system extends more than 5,000 feet, including both forward and return lengths, through Packard departments machining cylinder blocks, cylinder heads and exhaust manifolds for new Clipper models.

With the turning radius of the system's rubber flights regulated only by bending capabilities of the conducting pipes, the installation of the conveyor was adapted to machine placement.

Fifteen Small Motors Supply Power

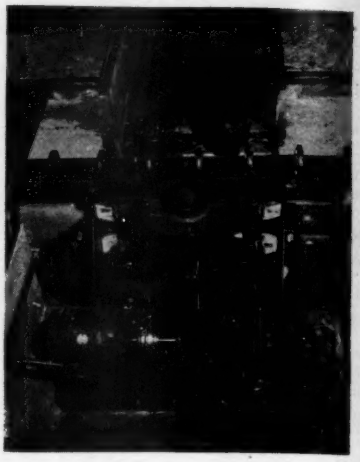
Virtually all steel chips from the 181 machines serviced by the system fall directly through the floor grating covering the conveyor trough and are moved to the briquetting plant for reprocessing. Nearly all physical handling of steel particles is eliminated because of the conveyor's flexibility.

Power for the system is supplied by 11 one-horsepower and four three-horsepower motors. Conducting pipe sizes range from four to eight inches, depending on volume of chips to be handled.

The system includes eleven cross conveyors and 14 transfer hoppers. Chips deposited at the farthest point from the briquetting plant will require four and one-half hours to move through the system.

Unique Sealed Conveyor Link Pin

Packard requirements for the system called for disposal of 40 cubic feet of chips per hour. The installing firm estimated capacity could be increased three times without supplementing existing facilities. A spokesman of the conveyor manufacturer said tests on smaller models of the new Packard system indicate life



Open grating shows section of return conveyor in 6-inch open channel. Upper portion shows a 4-inch feeder conveyor chain operating through open trough and returning in 4-inch open channel.

of the rubber forcing discs will exceed that of the conducting pipes, which can be quarter turned as wear is detected on inside surfaces.

Wearing qualities of the new system are said to be enhanced by use of sealed conveyor link pins, utilizing self lubricating rubber washers, which prevent wear by abrasive dust. Through elimination of metal-to-metal contact, the system is virtually noiseless in operation.

THE types of product from the different processes in the textile industry are so varied that special equipment is often required that can be only used on one, or maybe two, processes. Other types of more or less standard equipment have a more extended use throughout a mill. The problem thus becomes one of not only using "standard" but also "special types" of handling equipments.

Out of justice to the textile industry as well as to the manufacturers of handling equipment, it should be stated that already many of the problems have been solved most efficiently by many mills. "Unit" machines such as belt conveyors, coal pilers, hydraulic trucks, electric haulers and lifters, and other equipment that is suitable for conveying "stock in process" and other material, are being used in increasing numbers by the industry.

Monorails, with switches and electrical hoists, are being installed. They furnish a very efficient and flexible means of handling with a saving in time and labor. This especially is the case in the weaving department where heavy materials such as warper and loom beams are conveyed. Some organizations have developed the use of monorails still further and installed, in each span, cranes that travel lengthwise of the room. With the hoist, movable across the crane, this whole unit is most flexible.

There are several places where handling equipment can be installed and used beneficially. A system of monorails around the platforms of warehouses, into the various sections of such buildings and others.

In the mill proper, the picker laps are now being transferred in a semi-automatic manner by the use of trucks holding four to eight laps. Yet even these are generally pushed by "hand" from one location to another. Some mills are using a continuous "single rail conveying chain" that carries laps, card and draw frame cans to the various places where the material is used. The stock passes continuously by the various machines and each particular item is taken off at the point at which it is used.—Edward P. Taft, John A. McPherson Co., Greenville, S. C.

XUM

EZRA W. CLARK
Clark Tructractor Division
Battle Creek, Michigan

Condensations of three addresses given at two recent Industrial Packaging Expositions. The two first ones were delivered in Chicago, the third one in Atlantic City.

ARTHUR H. DOBLER
Electric Truck Division
The Yale & Towne Mfg. Co.
Chicago, Ill.

WHAT THEY SAID

——handling in relation to packaging——

By EZRA W. CLARK
Clark Tructractor Division
Clark Equipment Co.
Battle Creek, Mich.

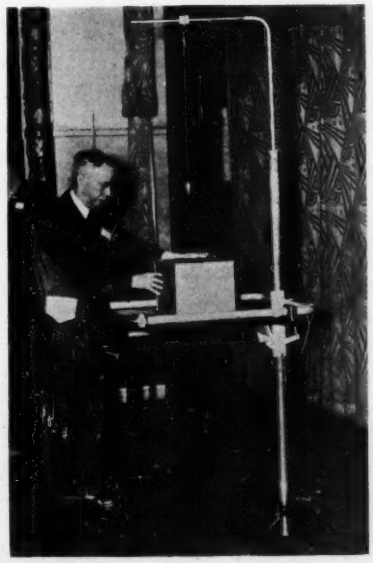
THE mechanized movement of packaged goods is here and we of this day, the lift truck manufacturer and the packaging engineer, have the responsibility of adapting the palletized unit load and the power truck to present day problems in such a manner as to conserve our labor resources and thus reduce the final cost of the product.

Here are some of the factors that must be considered in the proper solution of our problem. Packages, as you engineers well know, are designed to meet the exact needs of the product requiring dimensional limitations as to size. We must also study the density of the product, which is the relation of the weight of the product to its mass.

The final packaging specifications as defined by the packaging engineer must be such as to insure the security of the product and its prompt delivery in pristine condition to the user. Whatever the product, the packaging specifications must provide reasonable protection against pilfering.

Solving a Mutual Problem

Thus, the needs of industry require greater skill and experience in packaging. Door handles, locks, automotive hardware, carburetors, headlights, glass and the thousands of items entering into the automobile are packaged according to the individual product.



A. L. GREEN, Special Representative, Association of American Railroads. He is shown at drop test table.

The packaging engineer's responsibility does not end with packaging. He must envision the life history of the product as it moves from inspection through the packaging process and the successive steps in its movement to the point of use in the customer's plant or the consumer's hands.

At this point the material handling engineer steps to the side of the packaging engineer, giving him the benefit of his experience. A vital factor in the successful solution of the problem is the elimination of unnecessary and avoidable individual handling of the packaged product; i.e., multiple handling.

Up pops the pallet idea and the concept of the unit pallet load and the concept of the pallet as a carrying medium. A carburetor is individually packaged. Ten, twelve or two dozen carburetors are grouped into a carton and a number of cartons placed on a pallet are steel taped or otherwise secured to same. The combined load, consisting of perhaps 300 to a 1000 carburetors, moves as a unit from place of origin and packaging to the point of use. The packaging engineer, knowing the dimensional characteristics of his cartons and considering the density of the load,

selects a suitable pallet that will insure the safe and pristine arrival in the customer's plant.

Pallet Classifications, Sizes

The greater the density, the greater the weight and the smaller the pallet. The lighter the density, the greater the carton dimension and the larger the pallet. Thus the packaging engineer, consulting with the material handling engineer, has the choice of the following standard pallet sizes: 30 × 40 (or 42), 36 × 42, 42 × 42, 48 × 48.

The pallet size is only part of the problem of pallet selection. For the purpose of our present consideration, pallets are to be classified under three headings: Expendable, durable, permanent.

These I will briefly describe as follows:

The *expendable pallet* is of a type, size and specification so that it may be used to make one or probably more trips. It must be low in cost, simple in design, light in weight and of such a nature as to have only scrap value. The cost must be less than the savings effected on the first movement in which the pallet is used. This pallet will probably be made of paper or some other cheap material.

The *durable pallet* is of such size, design and specification as to permit repeated use to a maximum of eight to 10 trips. It will have a much longer life if it is used to any great extent for warehouse or simple storage purposes. The durable pallet will be found to be made of wood or possibly paper, plastic or a combination of these. Care must be used in the selection of the durable pallet, or maintenance costs will be high, depending upon the character of the commodity with which it is to be used, the packaging of same, loading, etc.

The *permanent pallet* should be of such size, material and design as to be capable of continuous reuse with low maintenance cost, means of identification and protection of ownership.

The recurrence of 40″ × 48″ dimensions in pallet sizes is caused by the size of motor trailers and railway box cars. The motor trailer width will accommodate two 40″ wide pallets; the box car width will accommodate two 48″ wide pallets. Preliminary investigation on pallet sizes seems to indicate that the four-way 40″ × 48″ pallet will be most useful for combination motor truck and rail shipments.

Considering Some Variables

There are a number of products which, because of their size, weight and shape, cannot be combined with others to form a unit. Properly crated, each can be handled as a unit load by powered material handling vehicles. Such items are: radios, stoves, refrigerators, washing machines, etc. It is the packaging engineers' responsibility to include in the crate design the necessary 3″ under-clearance to permit the insertion of the forks.

The competent specialist, be he a packaging engineer or a material handling engineer, or the two working hand in hand, must be able to segregate and define the ascertainable facts as to the birth of the product, its clothing in proper shipping garments, the cartoning into a suitable overcoat, and the grouping of cartons on a correct pallet of appropriate design and construction to meet the requirements of the problem.

Thus you see there are many variables to be considered, evaluated and the measure of their importance applied to the packaging and shipping problem.

In the field of cosmetics, the package often costs as much as the product, because it may be the prime factor in selling the product. The cosmetic manufacturer must depend on the attractiveness of his package to sell its contents.

The manufacturer of drugs, vitamins, or biologicals goes to the individual with a different type of package. He dresses it with a specification that inspires sincerity, purity, and healthfulness. The packaging engineer must evaluate every ascertainable fact as to the product and express the value of these facts in his packaging specification.

This is an outline of your problem. Its solution will be a lot of fun. The success of your solution will depend a great deal on your training, experience and competency, plus that priceless ingredient of enthusiasm that should be a part of everything that we do.

STREAMLINING THE PRODUCTION FLOW

By A. H. DOBLER
Electric Truck Div.,
The Yale & Towne Mfg. Co.
Chicago, Ill.

MOST plant operators don't know or don't fully appreciate that the handling of material in a plant represents from 25 to 40% of production costs. The reason that management is not conscious of such figures is that the cost accounting systems of most companies don't show what is paid to workers hired specifically to lift and move materials. In other words, it is not at all uncommon in time studies and cost accounting to allocate some material handling costs to *production*, or to charge them to overhead as "indirect labor payroll" on the operating statement.

Until management sees that production *is* material in motion and learns how to keep it moving, little future progress can be expected in cutting costs. When the modern plant is looked upon as a material handling *system*, then and then only will it be possible to gauge the excess cost out of the production dollar.

But the belief that the modern plant is basically a material handling *system* isn't quite enough either. Management must ACT upon that belief! Sure, we can say put it in cranes for this or that job, use a conveyor here, or hoist there. Get yourself a hand lift truck for this work, or use a power truck for big loads. But that isn't the answer. These recommendations never gave anyone a material handling *system*. Industry has been doing that kind of buying for years, and still it takes at least 30% out of every production dollar to keep material on the move.

Planned Handling Cuts Cost

The only way to cut the cost of material handling is to streamline the flow of production. Material handling is a big enough cost to warrant the appointment of a man or a group of men to study your plant layout, analyze production flow, and make use of the kind of material handling equipment that will coordinate all operations into a smooth running whole. Appoint and give these men the *authority* to do whatever is necessary to keep

material in motion economically.

By now you are probably wondering just what this man or committee or department will accomplish. So let's enumerate some of the advantages that come along with the planned application of modern material handling machinery and methods.

To begin with, you get fast movement of material in quantity. You coordinate its flow with the speed of your production machines. You shorten the processing cycle by setting the pace of production. That alone is a worthwhile objective.

Planned Handling Improves Production

You eliminate the cost of *rehandling* individual pieces. To give you an idea of just what this means, just assume that the incoming daily tonnage of a plant is 10 tons. Wasteful, time-stealing *rehandling*, piece-by-piece, may multiply that tonnage a hundred times before finished products are shipped. Surely, any system that cuts down *rehandling* has real merit.

Next, planned material handling methods and machinery make it possible to avoid a lot of the "muscle moving." Yes, it wipes out one of the most potent factors—man handling—that now limits productive effort and worker safety. A tired worker can never do a 100% job. It's one of the reasons why industrial insurance rates are still so high.

A great many plants still depend on skilled help to bring material to and take material away from their work stations. After cutting corners to save a few cents on the cost of a part, many companies still spend a lot more to move it around. But with a modern handling *system* in the plant, these workers stay at their machines—keep producing—while material is brought to them in quantity. In other words, mechanized handling cuts costs by creating better production control.

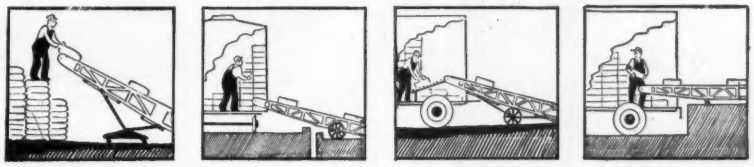
Because material *in quantity* can be quickly placed within reach of machine operators by adequate handling equipment, they do less reaching, lifting, and moving. Material handling machinery helps boost production in this way too. It always amazes me that these considerations have rarely shown up in time studies.

(Turn to page 42)

SAVE MAN POWER - CUT COSTS - SPEED DELIVERY IN

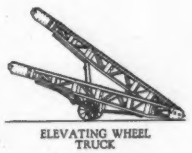
Warehousing & Distribution

of Loose or Packaged Products



PORTABLE CONVEYORS BY Farquhar

THE FEATHERWEIGHT MODEL 391



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HORIZONTAL WHEEL MOUNTING

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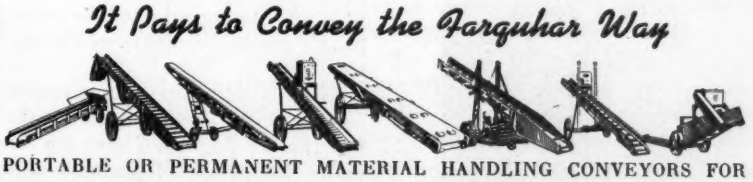


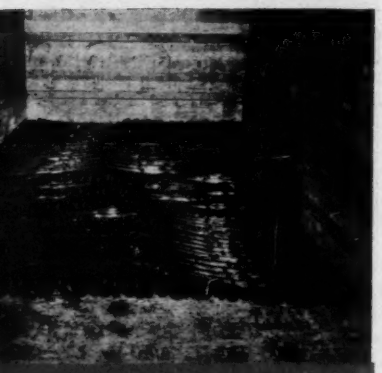
PORTABLE OR PERMANENT MATERIAL HANDLING CONVEYORS FOR COAL · COKE · SAND · GRAVEL · BAGS · BOXES · CRATES · CARTONS · BARRELS · ETC.

PORTABLE MACHINERY DIVISION

1856 NINETIETH ANNIVERSARY YEAR **A. B. FARQUHAR COMPANY** 1946

206 DUKE ST., YORK, PA.

Springs were formerly loaded into freight cars individually, as shown in photo below.



Now they are palletized at the end of production, then power handled in to car.

Low in freight car. Except LCL shipments, springs are loaded single deck.

Ford

The Ford Motor Company, long considered a leader in its material handling procedures (of manufactured st principle. Every step is "road-tested"—it must pay. off in keeping with their scope. But the basic princip the company with 100 employees as to

MATERIAL handling operations at the Ford Motor Company's River Rouge plant, Dearborn, are undergoing a comprehensive modernization project. These changes are far-reaching and are best understood in light of this frequently overlooked fact.

Contrary to a popular misconception, this colossal parent organization of the Ford Motor Company is primarily a manufacturing — not an assembly — operation. Hence you don't see new Fords "bouncing around all over the place." River Rouge's chief function is the manufacture of thousands of types of basic components for use by 13 branch assembly plants located in the major geographic sections of the country. These plants account for approximately 85 per cent of Ford and Mercury cars produced in the U. S., leaving the remaining 15 per cent to be assembled in Dearborn. In addition to a sizable volume of service parts, River Rouge also manufactures and ships a considerable tonnage of components to the company's assembly plants in foreign countries.

All this adds up to a gigantic supply operation—one that calls for the loading and shipping of many thousands of carloads annually, involving a large variety of products of many different sizes, weights, and shapes. The handling of these diversified parts in loading and shipping is the specific problem now being expedited by means of the unit load principle. Phases of the relatively recent program are still in the development stage, and hence this article is chiefly in the nature of a progress report.

The application of pallets, pallet frames, special racks and tierable bins involves several distinct phases of the far-flung Ford operations: (a) Components manufactured for shipment in the Rouge plant; (b) company-owned supply plants; (c) outside suppliers, and (d) the production operations of the Rouge plant itself.

Adoption of any one method or "package" for a particular part must first prove itself under actual operating conditions—must provide a clear-cut answer to the question: "Will it pay?" That is the basis of all changes adopted by the Material Planning Division, which works in conjunction with an experimental department. There is no room for guesswork.

After an exhaustive test of a particular handling method involving a certain product, a cost analysis is made of every factor involved—"before and after." The comparison of the two totals tells precisely what the extent of the benefit will be in terms of dollars and cents. And after that there is sometimes room for the experimental department to develop further refine-

ADDS SPEED TO MASS PRODUCTION

a leader in mechanized mass production, is revising ufactured stock) in accordance with the "unit load" must pay. And gigantic River Rouge operations pay basic principle of unit load handling applies equally to loyees as to the plant with 100,000.

ments. These may result in additional economies, provide better protection for the product concerned, or overcome weaknesses of a particular "package" design. While the several "before-and-after" comparisons given in this article are impressive, they are typical of the economies affected in many instances.

Adoption of the program, however, does not mean that the unit load method is replacing conveyors, for which Ford is famous. The two are simply being coordinated wherever feasible, with conveyor systems remaining wherever they are best adapted to particular operations.

Low Handling Costs Essential to Low Production Cost

The unit load plan was launched officially about 18 months ago with an appropriation for a palletization program of a pilot operation in the company's Edgewater, N. J., assembly plant. It was set up to receive all components in unit loads. The test demonstrated that 11,000 hours per month could be saved in the receiving operation. Remarkable economies were also achieved in warehousing and assembly operations, as compared with the previous piece-by-piece handling.

In view of this marked success, the program was then developed as rapidly as its size and complexity permitted. Two illuminating examples of unit load handling are passenger car springs and spindles.

Springs were previously loaded individually into outbound cars from the end point of the line, where a chain of men were stationed. The springs were passed from one to the other, and the last man in the "chain" loaded them in the car. Now the product is palletized at the end of the production line, as shown in one of the photos. Eighty springs constitute a unit load weighing a little under 4,000 pounds.

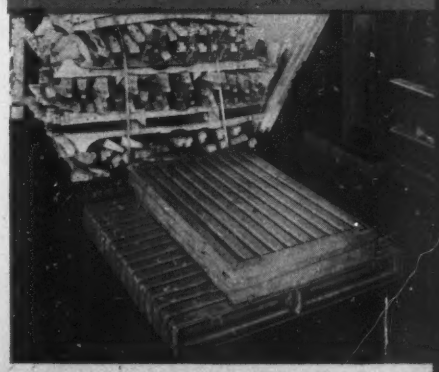
The combined loading and unloading time with the unit method is about eight per cent (7¾ hours) of the time previously consumed with manual handling (96 hours) per car. Thus manhours previously used in handling operations could be made available for productive functions.

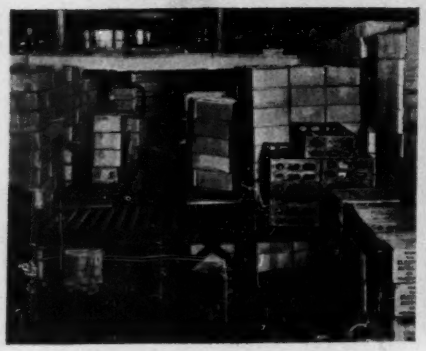
The freight on 20 pallets is $22.50, which also covers the return of the empties to the Rouge plant. The total saving per car is $71.78. This is significant by itself and also for another reason. It gives a hint of the potential cumulative saving on this one item in the course of a year. If 500 or 1,000 carloads of springs are shipped—and either figure is well within the realm of possibility—the annual gain would amount to a young fortune. All further figures on savings given in this article should be read with this in mind.

Shown below is collapsible pallet box, being set up for shipment of small parts.

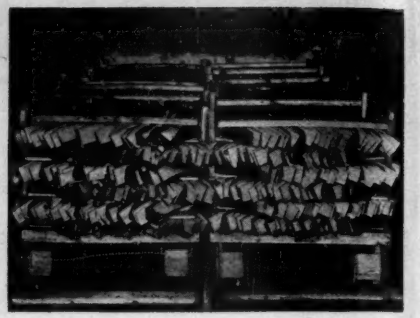
This photo shows the set-up box as it may be loaded in freight car, supporting load.

And this is how the box looks when collapsed. Thus it may be returned to plant.





Motor generators—before and after: Photo at left shows former loose package method. Palletized unit load, right, contains 144 generators.



This car bumper rack may also be mounted on a pallet. The six "shelves" accommodate 300 bumpers, about 3,900 pounds.

Spindles are an example of a product where greater savings were effected per car. This is largely explained by the nature of the product, which, unlike the springs, had to be boxed for protection of delicate parts. The figures show that the largest single item of expense was for the 400 wooden boxes, amounting to $400.00. If we add, for purposes of comparison, the depreciation on 20 pallets and 120 steel-tray separators, the difference in freight cost and return handling on these pallets and trays, we get a total of $43.00. This amount is only a fraction of the former cost of the boxes ($400.00). This is an excellent example of reduced packing costs made possible by the use of the unit load method, a fact which is frequently corroborated from other sources. *(See December FLOW, Page 54, "What Do You Know About Your Costs?"—Ed.)*

The Rouge plant also ships a large quantity of small items—pressed steel parts, head lamps and brackets, for example—that are sent in bulk form. For these items a special collapsible pallet box is being tested, which is shown in several of the photos. This container has been developed in accordance with the Ford Company's requirements.

The box is five-sided, with no top. It is attached to the standard 48" x 48" steel pallet and is about 30" high. Curved bolts are inserted in reinforced holes along the edges of the upper deck, securing the front and back walls. The latter have slotted openings at the top, in which the two side walls are inserted, as shown, whereupon they are ready to be bolted to the front and back walls, making a box.

One of the photos shows a palletized load of wood parts (for station wagons) stacked on the set-up box, a typical example in which shipment is made. The third photo in the same series shows the collapsed box as it may be returned from assembly plants to River Rouge (unless it is returned by a supplier loaded with small forgings). More will be said about the use of the two-way method in a subsequent section.

The collapsed box takes up comparatively little shipping space on its return trip. Another advantage of this particular steel unit is that it is approximately 40 pounds lighter than the wooden boxes used for the same purpose. Going and returning, that means a saving of 80 pounds on the freight cost. Again, when this is multiplied by the many hundreds of units shipped in a year's time, the total is a significant one.

Ford Supply Plants Benefit Too

Another pictorially illustrated "before and after" comparison shows the conversion to palletization of motor generators. These are received from the company's manufacturing plant in Ypsilanti, Michigan. Formerly this product was received in cartons (and sometimes in aluminum crates), at River Rouge for distribution to Ford and Mercury assembly plants.

Here, as in the case of spindles, the largest single item of expense was for packing. The combined loading and unloading time with the new method is six hours as compared with the 60 hours required with the previous method, resulting in a net gain of $135.60 per car.

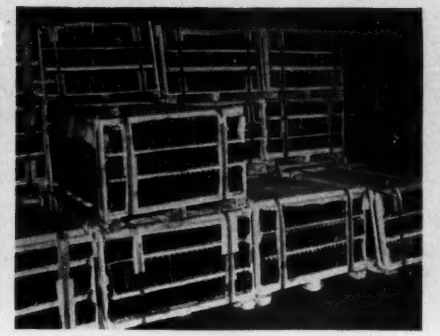
Figures alone, however, do not reflect all of the savings and improvements. For example, the unit load method of handling contributed noticeably to better housekeeping, and stock control was likewise facilitated considerably. This is to be expected when a company finds itself handling relatively few pallet loads as against thousands of individual containers through receiving, warehousing, and shipping. Clerical detail is simplified and, because of tiering, maximum use can be made of existing floor space.

While the economies effected are uniformly impressive, the preparations and study necessary for conversion to the unit load method should not be minimized. This is particularly true where many diversified products are involved. This consideration brings us back to the previously mentioned experimental department, whose responsibility it is to devise the most suitable kind of package for every type of product adaptable to unit load handling.

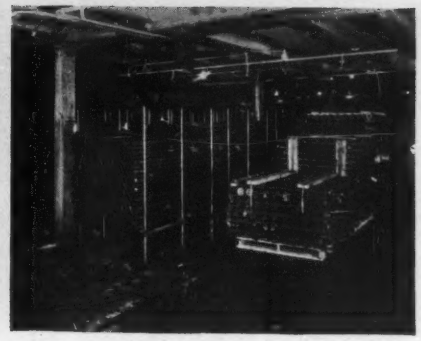
The generators offer a good example of the valuable work performed by this activity. At first the experimental department shipped the generators in wooden trays. "Not entirely satisfactory" was the report after several test shipments had been made. Reason: The depreciation factor on the wooden trays proved too great. Proposed remedy: Try steel trays. Several shipments with these revealed certain weaknesses, which were corrected. A stiffener angle on the edges was added and the welding was improved. The reinforced trays stood up well in subsequent shipments, adequately protecting the product, and they were then adopted as standard equipment.

As can be seen from the photos,

These strapped pallet loads of car mats contain 100 mats each. A handy method for loading and for assembly.



These running boards no longer have to be handled singly. Now 78 are handled in loading, tiering, and unloading.



At left, collapsible racks used for tubing. Drive shafts, right, may be shapped in same clever collapsible rack.

each unit load is built up in four layers with the use of the tray separators. The standard pallet size adopted by the company is 48" x 48", which is also the size of the trays. To protect the terminals, a dunnage strip is laid across each row of generators before the next tray is placed on top. An inverted tray serves as a cover for the load, and three pieces of 2" x 4" lumber are placed on top of the load for steel strapping purposes, as shown. With 36 generators to each tray, 144 make up the complete unit load weighing about 3,400 pounds. As in the case of car springs and some of the other items, 20 pallet loads make up a car.

Ford Assists Outside Suppliers

Equally instructive (in terms of savings as well as handling procedures) are several examples of outside suppliers furnishing various products — bumpers, floor mats, running boards, and steel tubing, for example. After the Edgewater pilot operation had proved its value, all suppliers were notified by letter of the company's desire to receive shipments in unit loads. While some suppliers were adequately prepared, other indicated their interest but lacked the necessary equipment. Representatives of the Ford Material Planning Division assisted the latter group in devising the proper rack or method for packing and shipping. In some instances the Material Planning Division developed a rack or pallet and sent it to the outside supplier as a model. This is another example of the service rendered by the experimental activity.

The car bumper rack shown is mounted on a skid platform for the simple reason that the supplier had platform but no fork trucks. As can be seen from the photo, six board separators provide "shelves" for six layers of bumper, 50 to a layer. The 300 bumpers weigh around 3,900 pounds. Pieces of 2" x 4" serve as uprights and cross pieces, with steel strapping over the cross pieces giving the load the necessary rigidity. This frame is approximately 51" high, 66" long and 48" wide. Previously, these bumpers were individually wrapped and placed in cars manually.

Saving per car: $95.00.

Another interesting example are car mats, 100 to a pallet load. Note how products of this type can be built into sturdy unit loads with the application of steel strapping.

Here, as in most of the other instances, the saving per car does not tell the whole story of the advantages obtained. Previously the mats were received individually wrapped. Six separate handlings were necessary at that time in order to move the product from incoming vehicles to storage and then to assembly. Not only was the former wrapping cost saved, but also the expense of the previous handling cost in moving the product to the point of use at River Rouge. These pallet loads are now delivered directly from the receiving point to the assembly line. As in the case of motor generators, stock control and housekeeping have likewise benefited to a marked degree.

Saving per car: $77.50.

A similar saving was effected on running boards. Like the mats, these were formerly handled individually—an operation that consumed 80 hours in loading and unloading, as compared with 7½ hours with the unit load method. Now 78 running boards are handled as a single load, in crates that are neat and tierable. And by "going up in the air" with the loads, a good many square feet of floor area are saved for other purposes. (Even at River Rouge—some thirty plants situated on grounds comprising 1,200 acres—floor space is often at a premium.)

Saving per car: $77.50.

Another noteworthy example of unit load handling concerns the shipping of steel tubing, used for drive shaft assemblies. These racks, shown in one of the photos, are collapsible, and are sent to River Rouge by Detroit and other suppliers. When the tubing has been consumed, the cross pieces constituting the bottom are simply slipped off the uprights. The collapsed racks take up a minimum of shipping space on their return trip to the supplier.

For loading purposes, the two uprights on each side are held together by a length of steel strap. A hole at each end of the strap is threaded over the upright, thus providing a rigid unit. This collapsible rack permits hundreds of feet of tubing to be handled as an economical and convenient package through loading, shipping, storage and assembly operations.

At the right of this photo are shown palletized loads of finished drive shafts, ready for shipment to Ford assembly plants. At present the Material Planning Division is considering the possibility of shipping both finished drive shafts and axles on the same collapsible racks on which the supplier ships the tubing. Again, with the help of the experimental department, the question to the answer "Will it pay?" will determine the outcome.

(Turn to page 62)

Study of the Unit Load System

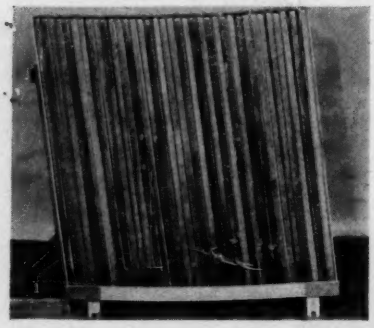
Since 1912, Singer has been developing modern material handling facilities. This concluding article presents more devices distinguished by their flexibility and interchangeability.

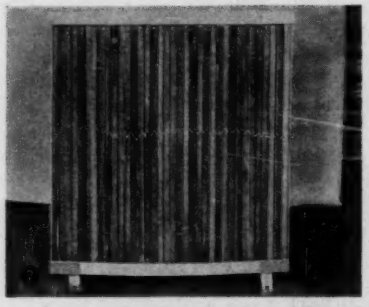
PART 2

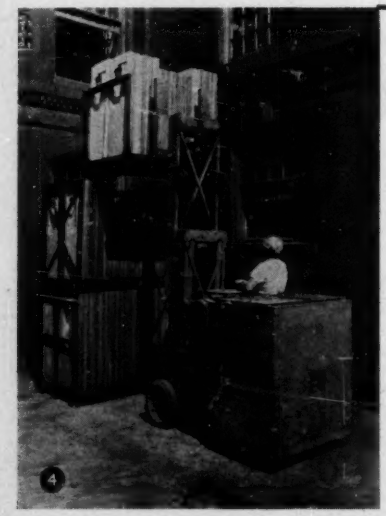
Every Detail Is Planned

A typical use of the skid platforms is to carry coiled strip from steel storage to the blanking operation in the press department. Typical uses of the skid boxes are to carry armature stampings through the press and annealing departments, or to carry field-frame and end-cover motor castings from the foundries through the machining, assembling and inspection departments to the shipping department.

A tierable steel skid 8 feet long by 3 feet wide is used for handling steel in 8- to 10-foot lengths too heavy for coiling. This material is usually received in unit-strapped bundles averaging two to three tons in weight, in gondola cars. It is unloaded by crane, unstrapped and put on the steel skids which are then tiered by one of the larger platform-lift trucks. This saves much time compared to the use of permanent storage bins. Time is again saved when the steel is to be

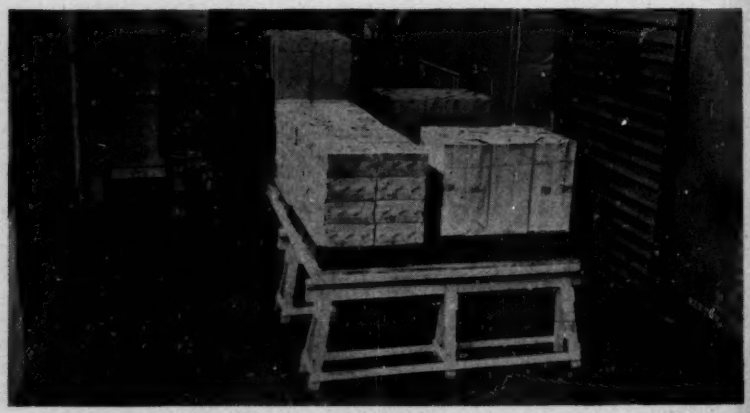






Photos No. 1, 2, 3, 4, this page: Sewing machine table tops are shipped in unit loads from subsidiary woodworking plants at a reduction of 75 to 85 per cent in manhours over the former manual carloading method. Packing cost was also reduced. No. 1 and 2 show two steps in preparing unit package; No. 3 shows strapped units as received at Elizabethport, N. J., parent factory. No. 4 shows the type of pallets with end frames used for handling the table tops in process. The one at the top is being replaced by the higher-end units below, which make the material accessible for making up orders in packing and shipping departments even though units are tiered.

Photo below: A short-cut for unloading cars in a part of the plant where the track is not depressed. The material is palletized in the car on dollies and then rolled out on the portable platform positioned at car door. From here the pallet loads are removed by fork truck. The empty dollies are returned to the car until the unloading is completed.



at The SINGER MANUFACTURING CO.

taken to the press department.

A tierable steel skid-rack serves for the handling of steel bars from steel storage, where they are cut to suitable length, to the drop forge department, and 8-foot-long cast-iron bars from one of the foundries to the screw department. These racks are tiered and carried between departments by platform-lift truck. They are designed also for easy in-process handling by hand-lift truck. This has been accomplished, as shown in the illustration, by providing an opening at both ends through which the truck handle can be operated when the truck is centered under the load.

All of the skid platforms, skid-racks, skid boxes and live-skid boxes are provided with a 12-inch vertical underclearance and a clearance of not less than 30 inches between runners.

As far as possible, the various departments have been located according to the normal sequence of work and thus minimize distances. The 24 buildings comprising the

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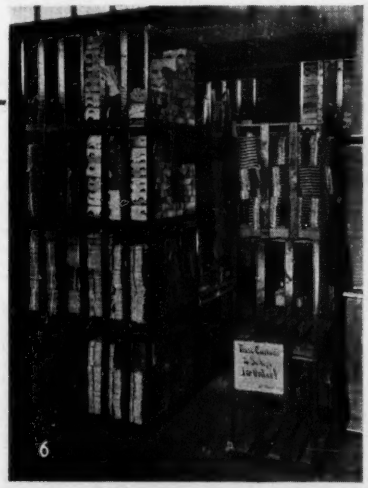
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Photo No. 5, below: This type of draw-bridge-plate, installed at principal carloading units throughout the plant, promotes safety and convenience. No. 6, 7, 8, 9: Good examples of specialized handling and storage units. Singer standard pallets with angle iron superstructure, No. 6: used for small, fragile or irregularly shaped items. These units also constitute sectional stock bins. No. 7: Standard pallets having four wooden locating uprights for table legs. No. 8: Steel skids 3x8 feet, used for hot- or cold-rolled flat bars too heavy to be coiled. These units are tiered, detiered and carried to the blanking department by platform lift trucks. No. 9: Standard pallets having 12 centering bars for band wheels. The centering bars are made from 31/64-inch steel. Each bar holds 25 wheels, each pallet 300 wheels.

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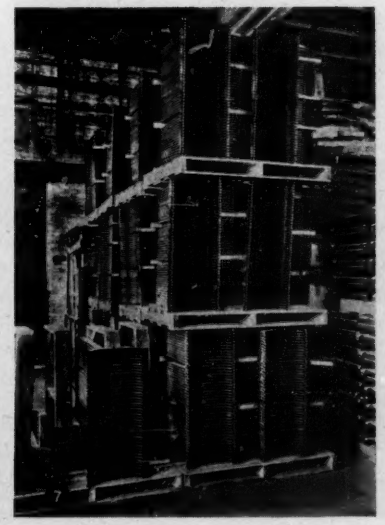
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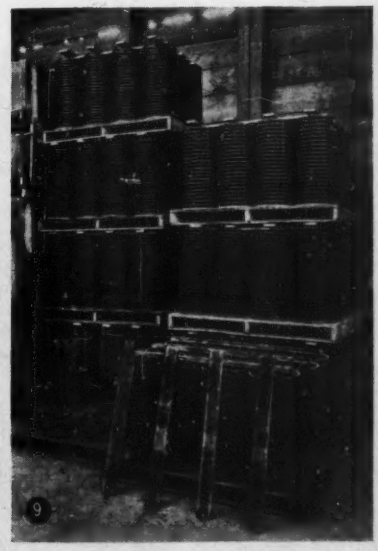
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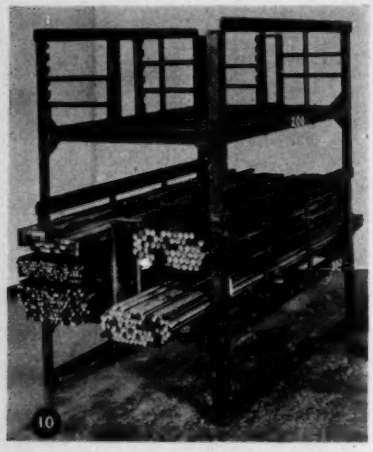
Courtesy, Storage Battery Power

plant are interconnected by paved roadways to provide straight lines of travel as far as possible between any two buildings.

However, because of the large size of the plant (it occupies an area of 103 acres) there are occasions when work of heavy tonnage has to be carried over distances well beyond the practical economic range of the skid-lift-truck system. For such hauls, the unit loads are carried over the plant railroad (which contains eight miles of standard-gauge track) or on trailers in train formation. All of the platform-lift trucks are provided with means of coupling so that they can be used for work of this kind as well as for pulling machinery on dollies or other trailing loads.



No. 10, above: Tierable skid unit carries bars from steel storage, etc., also 8-foot cast-iron bars from foundry by platform lift truck. The unit is also adapted to in-process handling by hand lift truck. Openings are provided at both ends for the jack-lift handle when the truck is centered under the load.

Standard and Specialized Units

Finished products, with the principal exception of small parts, which are handled in stock-boxes as already described, are largely stocked on pallets. For this purpose, 40-by-54-inch pallets were adopted as standard in 1935 since they have been found most readily adaptable to the majority of products as packed for shipment and as received from production or from Singer cabinet plants either packed or ready for packing.

Although nearly all work is carried through production on skids, much of it, on completion of the last operation, is put on pallets which have been superimposed on skid platforms so that they may be picked up and carried to stock by platform-lift truck and there tiered by fork truck.

A number of highly specialized handling and storage units are also employed, some of which are:

A live-skid shelf rack used for handling sewing machine frames between japanning, machining, assembly and adjusting departments. Each constitutes a unit load for interdepartmental platform-lift truck handling and, as it is on casters, is easily pushed from one operation to another within the departments. It is also a convenient holder for work in process. Similar live-skid shelf racks serve for handling extension tables between japanning, machining and assembly and for handling finishes machines between assembly and packing.

A standard 40-by-54-inch pallet which is provided with 12 upright centering steel bars $3\frac{1}{64}$-inch in diameter for handling and storing of finished family stand band wheels of $12\frac{1}{2}$-inch diameter, each bar holding 25 wheels, each pallet 300 wheels.

A standard pallet having four wooden locating uprights for handling and storage of pressed-metal or cast-iron sewing machine legs; 50 legs per locating upright; 200 legs per pallet.

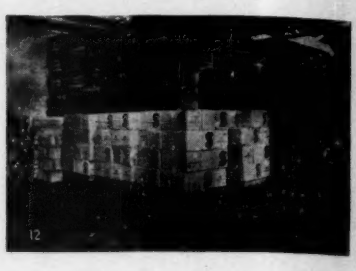
Photos No. 11, 12, 13: Outstanding feature of the Singer handling units is their flexibility. Sewing machine cabinets received from the company's woodworking plants in south, west and middlewest areas are unloaded upon standard pallets, picked up for fork lift truck and set upon standard skids—No. 11. After loads are thus unitized (No. 12) they are picked up by platform lift truck (No. 13) two at a time.

A standard pallet bearing an angle-iron and superstructure for handling and storage of manufacturing sewing machine table tops.

A standard pallet having a similar end plus top superstructure and braced diagonally for handling and storage of corrugated paper and other material too fragile to support loads tiered above.

Flexibility and Savings

The pallet units are adapted to interdepartmental transportation by platform-lift trucks merely by putting them on standard skids. A noteworthy feature of the pallet units having angle-iron superstructures is that the material can be added or removed through either of two sides both during process and while tiered in stock. For storage purposes, therefore, they are the equivalent of stock bins without the disadvantages of conventional permanent bins.



The manufacturing sewing machine table tops already referred to are manufactured by subsidiary woodworking companies with plants located in the South, South West, and Middle West. To permit unit handling for the carloading at these plants and for unloading of cars received at Elizabethport, a method of assembling the table tops into unit loads has been developed which, for handling purposes, is the equivalent of a 24-by-48-inch strapped pallet load but is less costly. The load contains 28 to 42 table tops depending on the thickness of the tables.

It consists of two 48-inch clamp boards four inches wide, on two runners, constructed, as shown in the illustrations, to locate two girthwise straps which bind the runners to the unit. This material when returned to the woodworking plants for re-use, amounts to a maximum of eight per cent or less of the weight of the table tops contained in the package. The cost of

the package per table top is less than the former cost of packing them two to four per package, paper wrapped and taped, when cars were loaded manually. But the man-hours required to load one car have been reduced by an average of 75 to 85 per cent. The same gains have been made in unloading cars at Elizabethport with power fork-lift or powered hand-lift pallet trucks.

The method, now regularly in use, is a result of experience with various kinds of pallet racks which, when durable enough to stand up in transit, were found to be excessively heavy and costly, representing 20 per cent of the weight of the table tops.

Several Charging Rooms

The industrial trucks are supplied with charged batteries by three battery shops in different locations. This has been found desirable because of the large size of the plant in preference to a single central shop. The company's power plant furnishes d-c power at 220 volts which is used for charging. Batteries in use range between 24 and 30 cells and are connected to the circuit four batteries in series.

The control panels are provided with variable resistors for regulating the charge rate, as well as resistors which may be substituted individually for any of the batteries requiring a smaller amount of charge than the others in the same series, thus maintaining an average of approximately normal rate regardless of the number of batteries connected. This is done by means of double-pole, double-throw switches on the control panels having "battery-on" and "battery-off" positions. The amount of required charging input is determined by test fork and the time required at the normal rate is recorded.

Distilled water is provided by steam-operated stills and is piped to the filler-hose connections located conveniently so that all batteries in the shop can be reached by an eight-foot hose which, with filler and signal box, is attached to the nearest outlet.

Batteries are exchanged by means of roller-top benches which are carried between trucks and charging outlets by means of platform-lift truck.

Oildraulic Levelators conserve manpower, cut costs. Save plant space, too, by eliminating ramps and loading docks. Loads up to 50,000 pounds elevated directly from plant floor to trucks, freight cars, different building levels, or machines. Levelator rises quickly and smoothly as oil is forced into powerful hydraulic jack by simple electric pumping mechanism (or compressed air). Operation safe, dependable, economical. Installation simple.

Levelator car, when down, becomes part of floor and can be trucked over. Plant floor can be poured at grade instead of at railway or truck bed height —a real cost saving.

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Illustrates how this efficient equipment can handle almost any lifting job faster and more economically. If interested in freight or passenger elevators, also request Catalog RE-301 on Oildraulic Elevators. Address request to:

ROTARY LIFT COMPANY
1170 Kansas, Memphis (2), Tenn.

Rotary OILDRAULIC LEVELATORS

WHEN THE MEN IN YOUR SHIPPING DEPARTMENT GO HOME, ARE THEY

Happy OR Grouchy

With adequate Ironbound materials handling semi-live skids, skid platforms and floor trucks, your shipping personnel will be less tired after a full day's work and better able to fulfill the following day's handling . . . your unit handling cost will be greatly reduced, too!

Our engineers are able to cope with all handling problems—whether they be at the manufacturing end or the shipping end of your production.

Write for Bulletin 40

IRONBOUND BOX & LUMBER CO., 30 Hoffman Place, HILLSIDE, N. J.

Ironbound MATERIALS HANDLING DIVISION

SKID PLATFORMS | SEMI-LIVE SKIDS | FLOOR TRUCKS

Materials, men and messages move faster, easier over *any* surface . . . rough . . . soft . . . or smooth . . . on General Industrial *Pneumatics.* You avoid spillage and breakage from rough-riding equipment, save money on maintenance of equipment and floors, enable workers to do more work . . . faster . . . at lower costs.

Only General Pneumatics give you the extra-capacity wide-base rim . . . heavy duty tire . . . separate tube . . . *assembled* as a complete, quick-demountable *wheel!* . . . the *standard* of the Army Air Corps for ground service.

On your new material handling trucks or rolling equipment *specify* General Industrial Pneumatics.

Assembled!

Heavy-duty Tire • Separate Tube • Standard Wheel

8" to 22" o. d. for loads of 180—1900 lbs. per tire.

Dept. 7

THE GENERAL TIRE & RUBBER CO. • Akron, Ohio

INDUSTRIAL PNEUMATIC TIRE • TUBE • WHEEL UNITS

ANSWER TO COST CONTROL

(Continued from page 17)

strive for better ways of doing things.

Night foreman: As already indicated, our company is adding more units to its present fleet due to increased production operations. This, in turn, has meant a need for adequate supervision of the night force. When proper supervision is lacking, it is well known, operators tend to become lax. For example, if they allow some paper machine platforms to become filled, the presence of too many rolls will interfere with operations at the delivery (winding) end of the machines. The addition of a material handling night foreman has forestalled such and similar eventualities. His praticular responsibility is to supervise the movement of materials from the paper machines, the wet machines and the beater room.

Clerk: Sound business practice calls for a certain amount of record keeping in the department. The service time of the individual material handlers must be recorded, for one thing. For another, accurate cost records must be kept. Only by knowing our costs do we have a yard stick for measuring the efficacy of our present methods and the value of any changes that are developed from time to time. In view of this, the services of a clerk pay for themselves many times over.

Making the Program Work

The superintendent: His two major concerns are, of course, to (1) control handling costs and (2) to serve all departments with utmost efficiency. This is another way of saying that he is responsible for a well integrated and economically functioning material handling department. Under his direction, also, are improved working conditions and reduction of accidents to personnel and material. In carrying out his major objectives, the superintendent must, of course, appreciate the advantages and limitations of all handling equipment. Thus he is enabled to utilize existing equipment to best advantage, to investigate new methods and ideas, to devise special modifica-

TOOLROOM ON WHEELS

THIS "toolroom on wheels," converted by a millwright from a lunch wagon, saves time and steps on repair jobs at The Weatherhead Co., Cleveland. Instead of making numerous trips for tools

to the main repair shop, the millwright now takes his "efficiency cart" with him. Thus on-the-spot repairs are speeded throughout the plant. The small drawers hold screws, bolts, nails, brads, and washers, and the value of the tools is about $200.

tions or adaptations of standard equipment for the economical handling of certain materials that may present a problem.

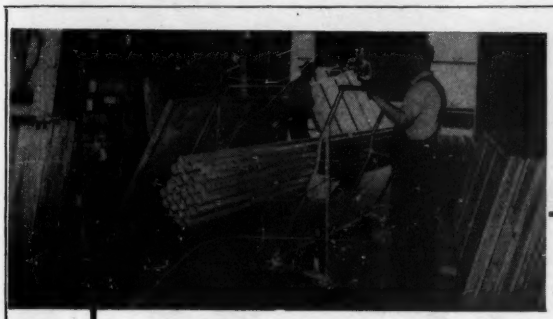
Under the superintendent's direction, the material handling department works in close cooperation with all superintendents in production, finishing, warehousing, and shipping departments.

This summarizes the chief functions and responsibilities of the centralized material handling department at our company.

Following is a list of specific operating improvements, promised earlier, as noted by the engineering department since the program hit its full stride following the six-month trial period. 1. Departmental superintendents are relieved of material handling problems, permitting them to concentrate on production operations. 2. Heavy types of manual labor have been eliminated with the extension of mechanized applications. 3. Safety hazards have been notably reduced. 4. The work flow has been made more efficient and direct through the provision of proper aisleways. 5. Because interdepartmental friction has been eliminated, improved personnel relations have resulted. 6. Better care and maintenance of equipment is evident. 7. Handling costs of incoming manufacturing supplies are reduced. 8. The cost of outgoing shipments has likewise been lowered. 9. The improved refuse collection system has been of value both from the viewpoint of dollars and cents and good housekeeping. 10. Systematized deliveries of "service" materials have eliminated waiting time. 11. With adequate equipment available to all departments, the overall investment has been reduced. 12. The availability of accurate cost records is of help to general cost accounting. 13. Arising material handling problems can be more quickly recognized and solved without costly trial and error methods.

To repeat, *centralization of control has enabled us to render maximum service at minimum cost.*

FLOW has moved to larger quarters. You can speed delivery of your mail by directing your letters to 1240 Ontario Street, Cleveland 13, Ohio.



Handling Pipe and Flat Crates in a Metal Warehouse.

Specially Designed to Handle Long, Awkward Flat Loads

The ROL-AWAY enables one man to move long, flat material and pipe—with ease and safety—doing jobs ordinarily requiring three or four men. Ideal for flat metal plates, plywood, plate glass, pipe, tubing and large flat crated material. No lifting required to load or unload. Saves floor space—rolls in any direction—much faster than *any* other method. Capacity 2400 lbs.—weight only 64 pounds. Rol-away will save its low cost in a few days time. Get the facts on this time and labor saving truck, NOW.

Send for Free Illustrated Folder TODAY!

The ROL-AWAY

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Beal Pipe and Tank Corp.

2101 South West Jefferson Ave., Portland, Ore.

WHAT THEY SAID

(Continued from page 31)

Most plant accidents and losses through spoilage can be chalked up to the willingness of plant operators to go along depending on muscles to lift and move material. One of the best ways to improve employee relations in a plant is to take the sweat out of getting material from where it is to where it is needed. If you want to put more men in production jobs, let machines lift, move and stack heavy loads.

That Wing May Not Be Necessary

In the past, many a company built new plant additions because the management thought more floor space was needed. What a waste of capital investment! With today's material handling tools, space can be saved on receiving and shipping docks, in the plant, and in the warehouse by taking full advantage of what we call "air rights." It means using *vertical* space—stacking to the ceiling if practical and necessary. By doing it mechanically there is a great saving in time and space.

Following this idea even further, we can see that neat, compact stacking is a sure way to keep better inventory records of raw material, material in process, and warehoused finished products. And modern material handling equipment goes a long way in cutting down on the time and cost of moving material into and out of storage . . . in big unit loads on pallet, skids or in skid bins.

By taking advantage of vertical space in the plant or warehouse, you can in many cases forget all about adding a bay or putting on a new wing. Yes, I have seen a great many instances where the use of a good, well-planned material handling system eliminated faults in plant layout and so stepped up productive capacity, doubled storage capacity, and sliced costs.

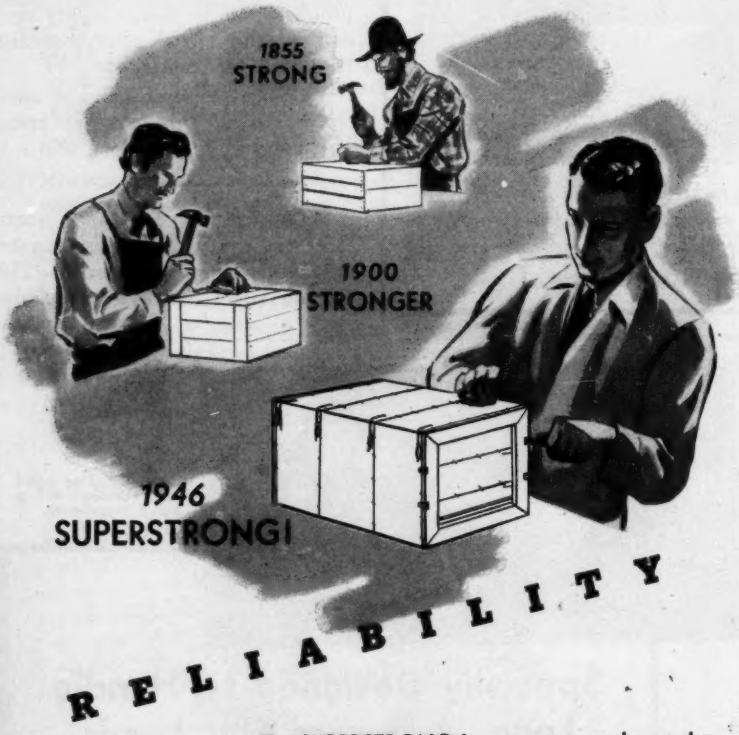
Another point has to do with demurrage charges. When goods are handled as unit loads, trucks, freight cars, and ships can be loaded and unloaded in a fraction of the time it takes a crew to do the job. That means a real saving in demurrage charges—and you know how they can pile up if material isn't moved in a hurry.

It isn't at all unlikely that your man—I hate to figure out a title for him, but it should be on his door in solid gold—will decide that he's got to hold his analysis to a single department or single phase of material at a time, in order to keep from getting too involved.

Anway, he's got to record how many times material is lifted, moved and set down during each handling stop. And you can add to this the size, shape, weight, and number of units handled individually at each location. He has to have this information because as a product proceeds toward completion, these factors change. And when they change, maybe different types of handling equipment will enter the picture.

Now let's get down to some of the physical aspects of the plant he has to know about.

How wide is the narrowest aisle? This has to be part of his figuring because the size of his loads is limited by it. He may even have to know the lowest ceiling height, for the same reason. And that goes for doorways and elevators too, wheth-



The SUPERSTRONG box or crate you buy today represents the experience and expert craftsmanship gained in nearly a century of better box making.

Many large users of shipping containers are planning with us for their long range requirements. Our engineering department will be glad to tell you how SUPERSTRONGS—"Bound with Steel"—can solve the shipping problems of your future postwar products.

SHIPPING SUPERSTRONG CONTAINERS

RATHBORNE, HAIR AND RIDGWAY COMPANY
1110 WEST 21st PLACE • CHICAGO 8, ILLINOIS

er he is looking at the loading platform, production area or warehouse.

A Specific Procedure for Results

Here, then, are some of the results you can look for when one person or a committee is given authority to streamline the flow of production. But the question is HOW can these advantages be achieved. I've put down a number of things that the handling specialist or engineer must consider. These points make it clear that material handling is a job that needs special attention.

Your man has to know the types and number of material handling machines now used in the plant. He's got to know the load capacity of each type of equipment and where it is used. These facts give him a picture of the tools he has to work with and enable him to suggest what equipment changes, if any, are necessary to streamline the flow of production.

Next comes the kind of containers used for carrying the material. These may be anything from a barrel or bag to a tote pan, skid or pallet. Then he will want to know how many of these loaded containers are handled at one time, and per day. Of course, this information should also include the pounds or tons handled per load transfer, and per day, as well as the number of locations to which materials are moved.

He will want to know how many men are needed to lift, move, and deliver material during each handling step, and how far the material must be moved each time.

To get at costs, he's got to know how much time it takes to make each move so that he can use the hourly pay rate per man to translate that time into dollars and cents.

Your man also has to know the route taken when material is moved from one place to another. In fact, when he actually gets down to it, he is going to lay out the routes for each department in the plant. He's going to find it a good idea to put these routes down on paper. And here he may be due for a few surprises. Most likely needless back-tracking or detours will show up. He'll see a lot of wasted travel time that's slowing up production. He may even find that changing the department or plant layout a bit will straighten out a lot of material handling problems.

You can add to this the type and condition of floor, yard or road surfaces—wherever material has to be moved. And he won't dare forget the dimensions of all storage areas, number of ramps and their rise, and all the physical characteristics of receiving and shipping docks. He will have to know how much weight a square foot of floor space will take, or he may be headed for trouble. And he has to set down whether goods are received by rail, truck or boat. He has to know all these measures that cut costs, and others.

That's the story. It all adds up to the fact that material handling still costs too much and that the only way to whittle that cost is to let someone—a man or a group of men—tackle the job and find the answer. He, or they, will take the kinks out of production and im-

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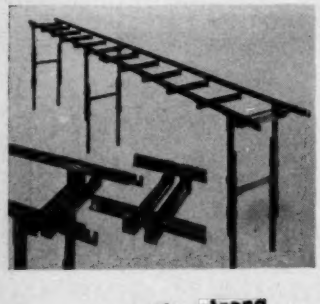

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Legs rapidly adjustable.
Ideal for conveying tools, finished products, products for assembly, packaged goods, etc. throughout the factory.

WAYNE PRODUCTS
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FRAnklin 7100

prove your handling cost picture.

"Do the economies that grow out of streamlining the flow of production warrant full-time attention?"

I think if you consider the question seriously, your answer will be an emphatic "Yes!"

DOING YOUR OWN PACKAGE TESTING

By A. L. GREEN
Special Representative
Freight Claim Division
Association of American Railroads

JUST a few big industries have installed the large revolving drum, and only a very limited number of small drums are used in manufacturing plants for testing the protection values of shipping containers. Such drums, however, have had an important place in testing by commercial and government organizations. Laboratories also use machines to get the load in pounds that boxes will take when compressed, shaker platforms, the Conbur incline-impact tester (named after our own Container Bureau which invented it), and other devices for analyzing the service-ability merits of shipping containers.

Simple Testing Device Recommended

Not many testers are suited to the problems of the great majority of shippers. Because of initial cost, need for technically trained personnel, and other considerations, relatively few shippers would consider purchasing testing equipment that is not simple to operate and sufficiently dependable to show quickly whether a shipping case will or will not furnish adequate protection for its contents against what an actuary might call the "normal expectancy" of damage.

An inexpensive drop-table seems to be the answer. As the name suggests, it is a platform hinged at sides, which, when tripped, opens at center like a trap door, to let the shipping case fall through. This apparatus is neither new nor untried. Commercial and government laboratories have used it over the years. During the war drop tests of greater severity than required for domestic hazards were specified for war packaging. It can therefore be assumed that quite a number of manufacturers are familiar with the practice.

It should be made emphatically clear that the drop table is not a substitute for compression, bursting, tear and other tests. It is a satisfactory substitute for the revolving drum and such allegedly practical procedures as rolling a package down a flight of stairs or similar rough handling. This form of testing has its limitations. A case of eggs, an open-top beer box, or acid batteries, for example, would not be suitable subjects for this test. Generally it is adapted only to packages of moderate weight—say up to 100 lbs. For a large number of tests, a complete analytical report and a well-equipped laboratory should be employed.

But where the average manufacturer of a damageable product wants to know whether there is a sufficient factor of safety in his packaging to withstand the unavoidable hazards of distribution, this test is thoroughly practicable. In fact, we know of no other method which can be followed by a person, not especially trained, that can be so exactly controlled, and which is as simple and inexpensive. Initial cost, and cost of operation are so low that even if used occasionally, it is worthwhile.

Eliminating Concealed Damage

We consider this test particularly suitable for comparing the merits and sufficiency of inner packing materials. The variety of such materials on the market suggests—and transportation experience confirms—that the most suitable type of cushioning, padding, partition, etc., is not always selected. Illustrating the importance of this phase from transportation and customer standpoints, the railroads last year paid about $8,519,000 for concealed damage alone. That means damage found after delivery to consignee in apparent good order.

Closure efficiency can also be compared in this way—tape, stitching or gluing of flaps, nailing and the advantages of metal strap reinforcement. Moreover, as a simple yardstick for determining whether the package meets the requirements of Rule 5 of the Consolidated Freight Classification, this type of

test is worth considering. Two of the more important parts of that rule are:

Section 1. (a) Articles tendered for transportation will be refused for shipment unless in such condition and so prepared for shipment as to render their transportation reasonably safe and practicable.

(d) . . . Containers must be such as to afford reasonable and proper protection to contents.

Section 2. (a) Articles which are easily broken, such as glassware or earthenware or articles in glass or earthenware containers, must be adequately protected within the shipping containers against damage or breakage by liners, partitions, wrappers, excelsior or other packing material.

A Check on Claims

In this way the resistance to rough usage of containers supplied by different box makers can be compared so that a shipper can test performance versus claims made by the container salesman. It acts as a spur to quality maintenance.

Another advantage that should appeal to shippers is that in dealing with standards, we work down to as well as up to them. In other words, where the article is overpacked—more expensively packed than the standard would indicate to be necessary—savings are possible by coming down to the standard. The factor of safety justifiable for an article worth $250.00 is higher than for an article selling at 50 cents a dozen.

Obviously, there is no single test that develops a complete criterion in the serviceability of shipping containers. In the case of fibre boxes, which probably are used for the shipping of 80 per cent or more of manufactured goods, a precise overall measurement of how the box should perform in warehousing and transportation can only be obtained from a comprehensive study in a well-equipped laboratory. For the general run of goods, however, the drop-table can be recommended. It is true that, where it is used, instances are likely to arise when the exact causes of damage cannot be identified. The operator will not always be able to determine what changes should be made. Those cases, of course, must be referred to the trained technician. The one

SLOW, laborious stair-climbing with arms full of packages is costly material handling — and adds nothing to the quality of your product.

Floor-Veyors speed the movement of materials between floors . . . they break the bottleneck of inaccessible and over crowded elevators and tedious man-handling processes.

Rapids-Standard Floor-Veyors are power belt conveyors manufactured specifically for use in between floor operations. Easy to install, they can even be placed in stairways without seriously interfering with foot traffic. Floor-Veyors are standardized units and are shipped in any specified length up to 30 feet. They are crated and shipped as a finished product, ready for immediate installation without difficult erection problems or costly fabrication work. Your "handy-man" can easily cut a floor opening and set this unit into place.

Floor-Veyors are simple in operation and are fool-proof. They operate on any standard electric current, including regular lighting. Being available in standard belt widths of either 12 or 16 inches they will handle a wide variety of diversified products easily and smoothly.

Floor-Veyors are low in first cost and are economical in operation. They will considerably reduce your handling time and costs and will speed the flow of your goods throughout processing, storage and delivery operations. Full information on request.

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The Rapids-Standard Co., Inc.

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described here is a performance test, so far as rough handling is concerned. In discussing this test, Don L. Quinn, who has employed the test for many years in his Chicago laboratory, says:

". . . There are many, many different kinds of hazards which containers have to resist in service. There are so many, in fact, no one ever attempts to enumerate them. Research studies have shown, however, that these many hazards create comparatively few different kinds of stresses and strains. The U. S. Forest Products Laboratory lists them as crushing, bending, shearing, diagonal distorting, twisting, puncturing, and abrading. Seven hazards in all. One is inclined to add humidity because of its effects on strength properties.

"The importance of each of the above forces varies with the particular kinds of container in use. In corrugated shipping containers, the three most important ones cause containers (1) to break open and spill contents; (2) to crush and thereby lose much of their protective value, and (3) puncture. Some of the other forces are sometimes involved, but by and large the three named above are most important.

"Resistance to these forces are strength properties in the cases. Being strength properties, it is a simple matter to measure them."

A Tentative Formula Offered

A tentative formula suggested for drop-table testing calls for 50 foot-pound impact drops, when applied diagonally, under controlled conditions, to one top and one side edge at each end, and flatwise onto each of the other six faces, for a total of 10 impacts. The criterion whether the package is or is not adequate for service is that it did not break open and there was no damage to the article which might justify a loss and damage claim. Minimum height of drop should be 12 inches; maximum, 5 feet (for a package weighing 10 lbs.). This formula, as stated, is purely tentative. The margin of error may be as much as 10 foot-pounds either way. It is suggested for the consideration of shippers in the belief that broad experience with this form of testing should eventually evolve a dependable way to evaluate the protective merits of containers before shipment—a way to forecast how they will act in transit.

I need scarcely add that the railroads have much at stake in a program of this kind. For the year 1944, about 57 per cent of the total amount paid in claims was for damage to packaged freight and, for 1945, approximately $50,000,000 was paid for such damage. A large part of this damage was chargeable to inferior packages of all types and inadequate interior packing. During recent years shortages of adequate materials and competitive conditions among those materials, have caused a very definite lowering of the strength of fibreboard boxes, in all their strength properties, but especially so in resistance to crushing forces. Surveys indicate that this loss in strength is at least 35% in comparison with prewar cases of like ratings.

For some time to come—for years, we hope—cars will be bulging with freight shipments. Damage hazards are not likely to diminish appreciably. Nobody wants damage.

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when you need it!
Plus
a light maneuverable easy-handling truck for ordinary operations!
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Combines the functions of several pieces of equipment in a single, easy-to-handle Hydraulically-operated truck. Places tote boxes, offers rigid support for machine work, and positions! Learn how you can save time, money, and eliminate hazards in your plant this work-saving way.
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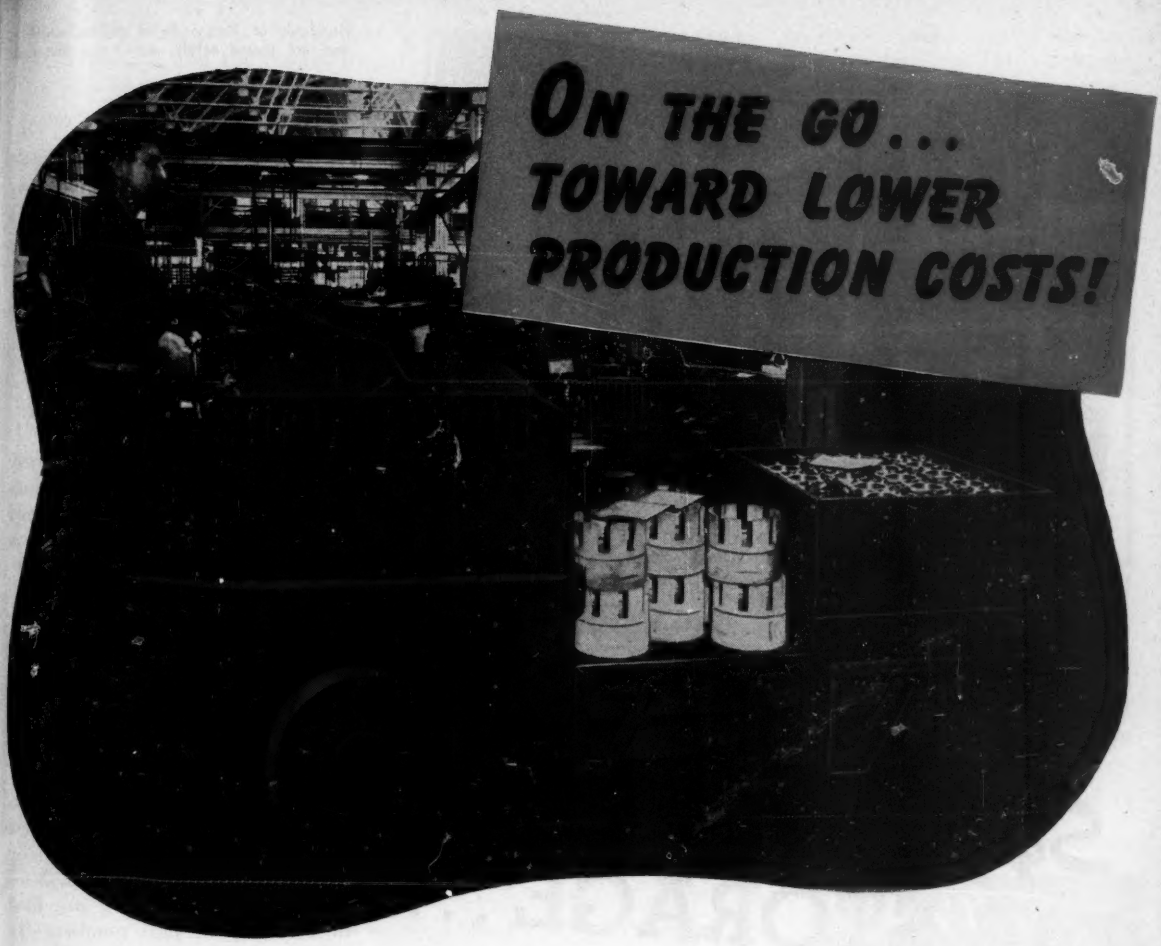
Material Handling Equipment . . . Engineered Hydraulic Devices



This Yale Electric Low-Lift Platform Truck is speeding parts to production. Large pieces ride safely on a skid, small ones in a skid bin. Unit load or multi-unit load, this powerful truck lifts and shifts material in a hurry. It picks up weights requiring the combined strength of many men . . . "delivers the goods" at a speed muscle power cannot match. Here's cost-cutting in a big way! Here's extermination of *muscle money*—those extravagant costs which pile up wherever old-fashioned material handling methods rule the flow of production.

Raw materials, goods in process, articles for storage or shipping . . . you can depend on fast, efficient Yale Material Handling Machinery to help you speed handling, lower production costs, economize on storage space, conserve worker energy . . . ride *muscle money* clear out of your production picture.

Get full details about the many advantages of Yale Material Handling Machinery. Phone our nearest representative, or write to us direct.

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HOISTS—HAND AND ELECTRIC • TRUCKS—HAND LIFT AND ELECTRIC • KRON INDUSTRIAL SCALES

Hundreds of thousands of dollars worth of dies are stored safely, neatly on this rack.

Systematized DIE STORAGE . . .

No one need "remember" where any of 2,500 dies are stored; now anyone can locate them in the orderly rack storage system—instantly!

By JOHN W. MacALLISTER, JR.
Production Cost Control Engineer
Northern Metal Products Co., Chicago

THE Northern Metal Products Company is a jobbing shop, manufacturing metal stampings and other components for use in automobiles, washing machines, radios, and many other home appliances and special devices. This operation involves the handling and storing of many dies, which represented quite a problem until we systematized our die storage by use of a rack installation and record forms. Our efficient rack storage today is saving time and dollars by making the dies instantly available when needed for production purposes. Full particulars on the advantages are given in later paragraphs.

Proper control over the dies is of extreme importance to us. The number of orders handled in the plant may require us to set as many as 500 dies in our presses during an average month. That means they must be located promptly; they must be in workable condition, and they must be readily accessible from among hundreds of other dies in the storage area.

Orderly Storage Provides Proper Control

Today, the locating of a die, or set of dies, is no longer the "memory work" it once was. (A foreman usually remembered where they were stored in several locations about the plant.) Upon receipt of an order from a customer, the general office issues an order to the scheduling department, which schedules it to the various production departments concerned. And the foreman of each department requisitions the dies needed from an operation sheet.

The die requisition form (1) used (a pink slip) is shown, also the die storage record form (2). The latter, a card, is made out for every new die added (as soon as a number and location have been assigned to it), and the card is kept in a permanent file. Note that the requisition form is provided with spaces for the customer's name, the part number, and the specific point of delivery in the shop, among other information.

When the die storage clerk receives the requisition, he refers to his card index of die storage records. (Each of these forms measures approximately 5" x 8".) These cards are filed alphabetically by customers' names, and the cards for each customer, in turn, are filed numerically for part numbers. In other words, one card is made out for each die. There may be five dies for a particular part, but each die has its own card and number. Working from the storage record card, the clerk enters the location information on the pink requisition slip. The die storage man then goes to the rack and, without losing a moment's time, proceeds to remove the necessary die from the designated bin and shelf—instantly!

After delivering it to the designated department, the die storage man signs the requisition form, indicating delivery, and returns the requisition to the factory office clerk. This form is then filed together with the die storage card so that anyone looking for this die while it is in process can find its location by the notation on the requisition form. When the die is ready to be returned to the storage rack, the original requisition form is removed from the storage card file and signed by the proper individual authorizing removal to storage. The pink record is gi

Flow

Please enter my subscription for FLOW magazine for

☐ 1 year $2.00

☐ 2 years $3.00

Canada, $3.00 per year; 2 years, $5.00; Foreign, $4.00 per year flat.

My name and Title

My company's name

My company's product

Street address

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FIRST CLASS
PERMIT NO. 8044
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CLEVELAND, OHIO

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Flow

1240 Ontario Street
Cleveland 13, Ohio

to the storage man who returns the die to storage, and the requisition can then be destroyed.

ing to make a particular item again, the die most likely will have to be sent to our tool room for grinding

be removed and sent to the tool room for grinding. This, obviously, interfered with production sched-

DIE REQUISITION

Date.....

Please remove Die for.....(CUSTOMER).....Part No.....

from Rack No.....and deliver to:

☐ Punch Press Dept. Machine No.....

☐ ..... Dept. Machine No.....

☐ Tool Room for Repair or change as follows:

.....

.....

Signed.....

Die removed and delivered by.....

☐ Return above Die to Storage Rack

Signed.....

(1)

DIE STORAGE RECORD

PART NO.	RACK LOCATION
CUSTOMER	TOTAL DIES IN SET
PRINT NO.	ALSO USED ON
DIE NO.	DATE RECEIVED
DESCRIPTION	

DIE REPAIR RECORD

Date to Tool Rm	Date Needed	Date Finished	Reason for Repair or Change	Name of Operator Last Using Die

(2) Returned to Cust. Ticket No.

The die requisition form, left, and the die storage record card provide accurate data on all dies.

Note that the die storage records have spaces for information which practically amounts to a history of the die. This is very important to us. In a jobbing shop such as ours, we do not know if we will ever make a piece again after we have completed an order. If we are go-

or other adjustments. Previously, before we installed the present rack system, we used to return the old die to storage at the end of the run. If the die was used again two months later, say, the operator set the die and ran a few samples. If burrs were present, the die had to

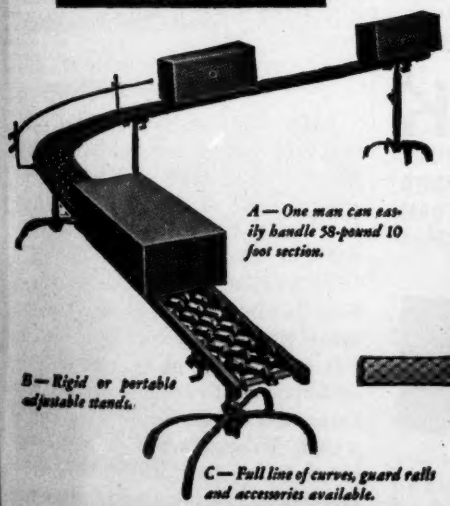
ules. Now, on the other hand, the die record will carry the notation, "grind before setting", and thus there is no loss of time or waste effort due to lack of information.

Rack Location System

The rack, which is built close to

MARKET FORGE COMPANY
STANDARDIZED MATERIALS HANDLING EQUIPMENT

LOAD-VEYORS
SEND FOR LOAD-VEYOR MANUAL No. 1004MH



A—One man can easily handle 58-pound 10 foot section.

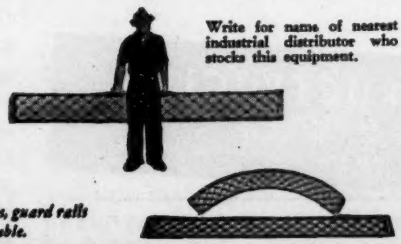
B—Rigid or portable adjustable stands.

C—Full line of curves, guard rails and accessories available.

A MAGIC CARPET FOR INDUSTRY

Load-Veyors combine great strength and light weight. Exclusive Market Forge features . . . grid construction supports ball bearing rollers on both sides . . . hardened inner and outer ball bearing races minimize wear . . . Load-Veyors may be used on either side . . . rails on reverse side provide for safe conveyance of small packages.

Write for name of nearest industrial distributor who stocks this equipment.



LOAD-LIFTS
SEND FOR LOAD-LIFT MANUAL No. 1005MH

SIMPLIFY YOUR HANDLING PROBLEMS

The use of the Load-Lift system will greatly increase your plant efficiency for the smallest capital investment of any adequate materials handling system. Saves double handling — utilizes space advantageously — reduces fatigue — eliminates damage from elements.

MARKET FORGE COMPANY MATERIALS HANDLING DIVISION 60 GARVEY ST., EVERETT 49, MASS.

Material handling?

PRODUCTION SKILLFULLY PLANNED, plant in tip-top shape, sources of supply secured —how about material handling—the vital factor in profit? Still using manual methods of yesteryear? *Use Clark Fork Trucks*—to lift, move and stack material. It's the time-saving, money-saving modern method, paced to the needs of current production.

Have a Tructractor Field Engineer study your needs—and engineer a plan to meet them.

CLARK

GAS and BATTERY POWERED FORK TRUCKS, PLATFORM TRUCKS, TOWING TRACTORS

CLARK TRUCTRACTOR
Division of CLARK EQUIPMENT COMPANY
BATTLE CREEK, MICHIGAN
OTHER PLANTS: BUCHANAN, JACKSON, BERRIEN SPRINGS, MICHIGAN

Products of CLARK • TRANSMISSIONS • ELECTRIC STEEL CASTINGS AXLES FOR TRUCKS AND BUSES • AXLE HOUSINGS • BLIND RIVETS INDUSTRIAL TRUCKS AND TRACTORS • HIGH-SPEED DRILLS AND REAMERS METAL SPOKE WHEELS • GEARS AND FORGINGS • RAILWAY TRUCKS

the ceiling, is divided into 27 bin locations, or tiers, each consisting of seven shelves. About 11 feet high and 48 inches deep, the rack covers a wall area approximately 100 feet long.

Each of the seven shelves in every bin location is identified with an initial, starting with "A" from the bottom and ending with "G" at the top shelf. In addition, each bin location (of seven shelves) carries a number, running in sequence from 1 to 27. Thus a die in location No. 16B is located quickly in No. 16 bin on the "B" shelf (second from the bottom). Painted on each die in red is its proper number and initial, permitting the operator to select the correct die from among the several stored on each shelf, and to return it to the proper bin. Every die also bears the customer's name.

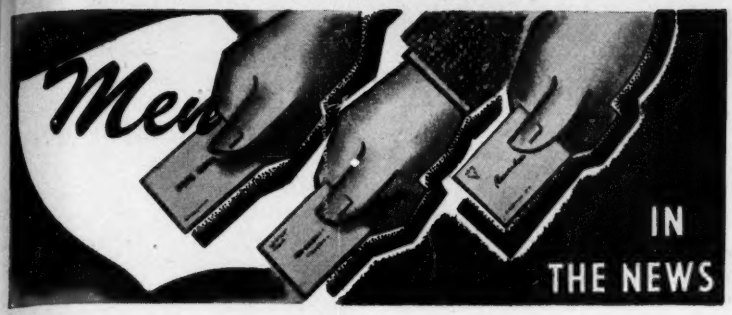
In this way, about 2,500 dies are stored in an extremely compact area, occupying only about 48 inches along the wall. The dies are put into and taken out of storage by means of a die lifter. Of course, the heavier units are stored on the bottom shelves.

The racks are made of U-construction angle iron, with continuous slots on the inside for clamping. They are adjustable at any point, permitting the shelves to be adjusted readily to any height, according to the size of the dies. Planking, covered with steel, is used for shelving, and the clamping eliminates any possibility of slippage.

Several Important Advantages

Before the installation of the present rack system, our company used wooden racks that were located in several parts of the shop. At that time we had to rely on an individual who knew where all the dies were located. This was the foreman in the punch press department. His memory served him well, but we couldn't make use of it if he happened to be attending a funeral or was laid up at home with a cold. This explains why our present rack and control system is saving time. The locating of dies no longer depends on a memory wizard. When a customer calls for a

(Turn to page 60)



LIEUT. C. R. GUSTAFSON, USNR, has returned to Signode Steel Strapping Co., Chicago, to assume the post of manager of the company's recently formed Railroad Sales Division. In 1943 he was commissioned in the U.S. Naval Reserve and assigned to the Containers and Materials Handling Sections of the Bureau of Supplies and Accounts.

C. R. Gustafson

MILTON H. (MIKE) SMITH has been named supervisor of fork-type lift truck engineering for the Hyster Company. The new supervising engineer has been with the Hyster Company for four years. He was formerly chief engineer of the Hydraulic Equipment Company, Cleveland.

Milton H. Smith

ROBERT Ten Broek Stevens was elected a director of the Yale & Towne Manufacturing Co., at the 78th annual stockholders meeting, it was announced by President W. Gibson Carey, Jr. The new Yale & Towne director was graduated from Yale University in 1921, and is Chairman of the Board of J. P. Stevens and Company, Inc. He is also a trustee of the Mutual Life Insurance Company of New York, a director of the Guaranty Trust Company, the New York Telephone Company, General Foods Corporation, Alexander Smith and Sons Carpet Co., and several other textile manufacturing companies.

R. Ten Broek Stevens

H. J. CRICHTON, Jr., former sales representative for National Bronze and Aluminum Foundry Co., Cleveland, has been appointed to the sales force of Gordon & Kinney, Detroit. This concern represents the Automatic Transportation Co., manufacturers of electric propelled material handling equipment.

H. J. Crichton, Jr.

IN LINE with the Baldwin Locomotive Works, plan for sales expansion, Roland C. Disney has been appointed manager of the eastern district of the company, it was announced recently by Robert G. Allen, general sales manager. Disney had been in the engineering department of the Western Electric Co. for 11 years before he was called to active duty in the army in 1941. He was recently discharged with the rank of lieutenant colonel.

CLIN MEARS, a former partner and sales manager of E. C. Beuhrer Associates, San Francisco, has been appointed sales manager of the industrial truck division of Salsbury Motors, Inc., according to an announcement released by E. F. Salsbury, vice president in charge of sales.

Mears entered the material handling field with Thomas Truck and Caster Co. He was assistant sales manager from 1937 to 1940, and served as field agent both for Thomas and the Barrett-Cravens Co. in the Pittsburgh territory from 1941 to 1942. The Salsbury organization is the chief subsidiary of Northrup Aircraft, Inc., and manufacturer of the Salsbury Turret Truck.

K. THEODORE KORN of Cleveland, Ohio, has been appointed supervisory engineer on the staff of N. H. Abrams & Associates, Indianapolis. Korn was formerly chief industrial engineer with the National Smelting Co., Cleveland, and has extensive industrial engineering background in both the operating and academic phases of the work. The N. H. Abrams and Associates organization specializes in material handling problems as a main function of general consultation activities.

K. T. Korn

O'ROLAND READ has been appointed director of sales of Speedways Conveyors, Inc., Buffalo, manufacturers of Speedways gravity case conveyors. For many years Read was vice-president in charge of sales and advertising of the Read Machinery Co., York, Pa. He was also connected with the Maryland Air Conditioning Corp. and Thomas Shiply, Inc. His plans embody a nationwide program of merchandising for the various Speedway products.

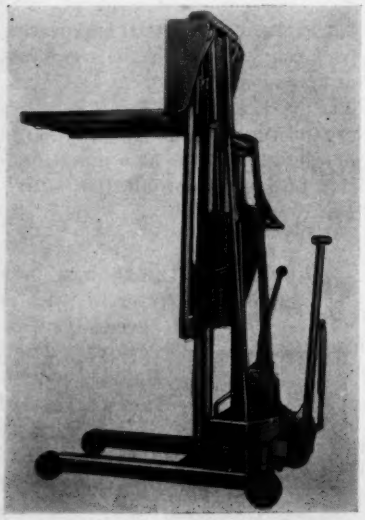
O'Roland Read

RICHARD W. MEACHAM, Birmingham, Ala., has been appointed the Yale sales representative for the Alabama-Louisiana-Mississippi territory of the Stamford Division of the Yale & Towne Manufacturing Co., according to an announcement.

For additional information on these products, write Dept. 5, Flow Magazine, 1240 Ontario St., Cleveland 13.

TELESCOPIC LIFT TRUCK FRAME

THE Lyon-Raymond Corporation, Greene, N.Y., has designed a telescopic frame for its new hydraulic lift-truck, which increases the elevated height of the platform to 84 inches. The telescopic section is of the same tubular construction as the base frame, insuring that added weight is kept to a minimum, states the manufacturer. An auto-steer with widespread front wheels is provided for stability. The truck can be obtained with either hand pump or a motor driven pump.

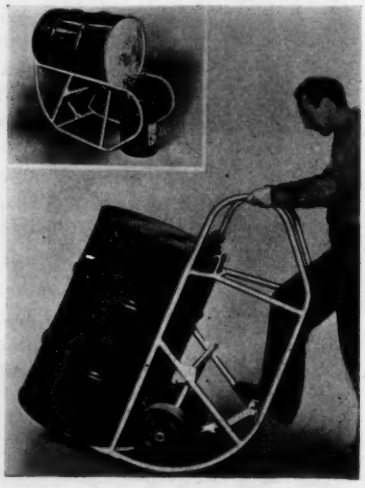


MAGNESIUM CONVEYOR

MAGNESIUM conveyors designed and manufactured by the Jervis B. Webb Company are now on the market, according to a recent release. The 10-foot sections weigh 68 pounds, and can be handled by one man. The company states that cargo transfer handling has been expedited by the use of these conveyors, and the magnesium resists deterioration especially in sea water atmosphere.

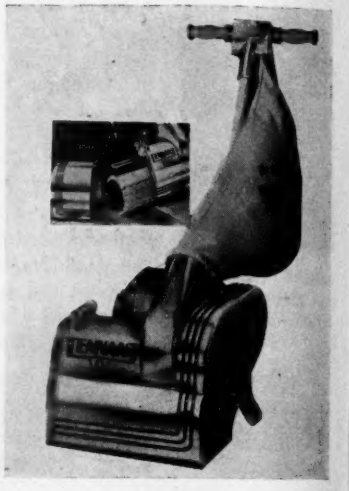
NEW DRUM TRUCK-RACK

A NEW combination truck and barrel draining rack for 55-gallon drums is announced by Aircraft Mechanics, Inc., Colorado Springs, Colorado. Called "Super-Toter Drum Truck-Rack", the new tubular steel assembly can be loaded by one man. All joints of the drum-truck are welded; weight of the entire assembly is 44½ pounds. Load capacity is 800 pounds.



DRUM-TYPE FLOOR MACHINE

THE G. H. Tennant Co., Minneapolis, Minn., offers an all-purpose drum-type floor machine that accommodates both 8-inch and 16-inch accessories, according to an announcement. The unit is said to permit cleaning, waxing, and polishing in one operation by use of a hard bar wax cartridge held in contact with a cylindrical brush or steel wool roll. The design of the machine permits operation flush with walls, desks, and machinery. The new machine works equally well on wood, asphalt, cork, linoleum and concrete, it is stated..

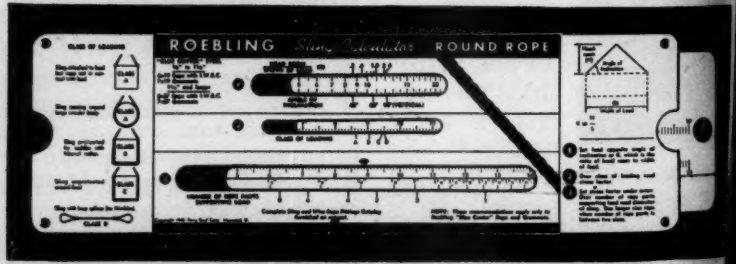


HAND TRUCK

THE Beall Pipe and Tank Corp., Portland, Oregon, announces a hand truck designed to handle un-

SLING CALCULATOR

A sling calculator is offered by John A. Roebling's Sons Co. to determine the safe working load for every class of lift. Full instructions for use as well as tables and diagrams are printed on this device. Write FLOW magazine, 1240 Ontario St., Cleveland 13, O., for this calculator.

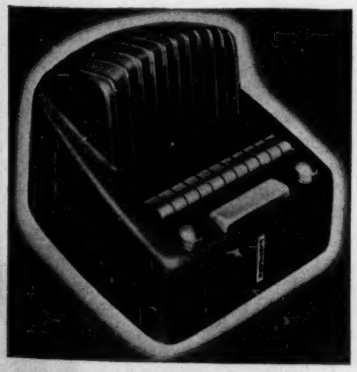


wieldy flat loads. Its upright position, according to the company, enables the operator to convey freight such as sheet metal, plate glass, plywood, plaster board, pipe, tubing, and long flat cased materials vertically.

The truck weighs 67 pounds, with casters of 2400-pound capacity. The "Rol-Away", as it is called, is designed with a detachable rack for handling of pipe or tubing. This rack is removed for flat loads, and the loading arm or handle is used in lifting the "Rol-Away" to insert the loading blades under the load.

INTERCOMMUNICATION SYSTEM

OPERADIO Manufacturing Co., St. Charles, Ill., announces a new post-war line of "Flexifone" intercommunication equipment. It includes a 10-station master, a 20-station master, a 6-station "Supervisor" master, and a remote speaker station with or without call switch, according to the release.



The company lists the following features: The housings are of die-cast metal; gray-tan Hammerloid finish; self-clearing, gravity-assisted piano type keyboard; selector keys and control of plastic, and "Finger-tip-Touch" talk switch.

MAGNESIUM DOCKBOARD

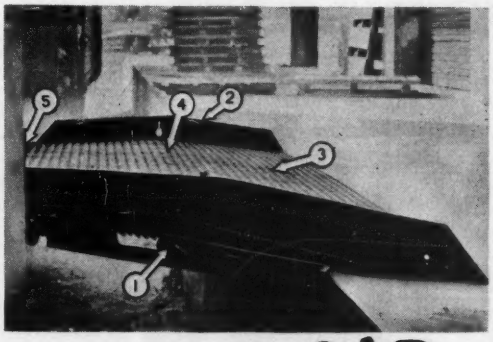
A MAGNESIUM dockboard for use in loading and unloading operations is announced by Magnesium Company of America, Chicago. According to the release, this dockboard is of all-welded construction, and can be supplied to the customer's specifications. Its light weight is stressed as a safety feature.

LIGHT DUTY GRAVITY CONVEYOR

A LIGHT duty gravity conveyor has just been placed on the market by the Island Equipment Corp., New York, N.Y. This conveyor is supplied with a choice of two types of quickly adjustable leg supports, single and double post, it is stated. It is available in several lengths in either straight or curved sections, and can be quickly coupled into a continuous unit.

SAFE and EFFICIENT

1. Full Range Positive Locking Device.
2. Side Guards Prevent Fork Truck Accidents.
3. Diamond Safety Plate. Non-Skidding.
4. Crowned for Different Car and Dock Leve'ls.
5. Beveled Edges for Easy Entry.



BRIDGE THE GAP WITH PENCO Safety Type Bridge Ramps

PATENT PENDING

Write Today for Bulletin 461

ONE-MAN OPERATION

1. Easily Placed in Position and Locked.
2. Easily Removed.
3. Easily Transported.

DISTRIBUTOR FRANCHISES AVAILABLE

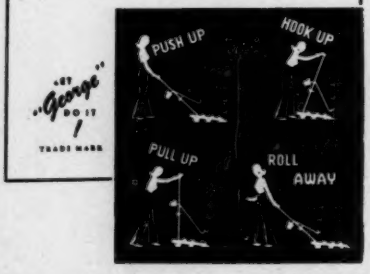
WRITE TODAY FOR BULLETIN 461

PALLET ENGINEERING COMPANY

625 Second St. • San Francisco 7, California

Meet him you must . . . on your factory floors. Put him to work thus . . . simply slip traction hook into box handle, pull back and your heaviest laden tote box glides over the beveled frame edge up onto the rollers with "the greatest of ease." Then lead it around anywhere with no more effort than to keep it rolling. "George" is a sensation . . . Ask for Bulletin F.

ROLOCK, INCORPORATED
FAIRFIELD, CONNECTICUT



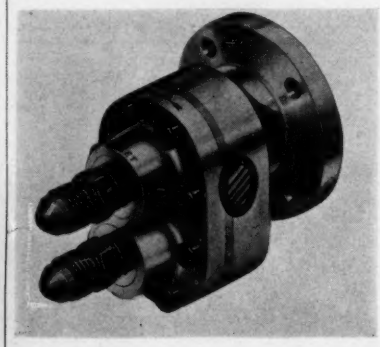
WHY ENGINEERED DESIGN PALLETS?

WHEN just determining the size of pallet to use calls for consideration of such factors as . .. inch pound rating of fork truck . . . length of forks . . . column spacing in warehouse . . . doorway widths . . . elevator capacities . . . width of operating aisles . . . dimensions and weight of commodities to be handled . . . dimensions of van trucks and railroad cars . . . . . Can you afford not to have your pallets **ENGINEERED DESIGNED?**

Pallets Inc.
Manufacturers of
ENGINEERED DESIGN *Pallets*
GLEN FALLS, NEW YORK
Telephone 2-2892

LUBRICATING PUMP

A SERIES 1200 hydraulic pressure lubricating pump has been announced by the McIntyre Company, Newton, Mass. It is said to be designed for pressure lubrication of bearings of machine tools, diesel engines, turbines, generators and other high speed machinery, and fluid handling in aircraft at high altitudes. The power requirements vary between 1/100 H.P. to 1/6 H.P. and the pump body is constructed of aluminum, with nitrided nitralloy spur gears and shafts.



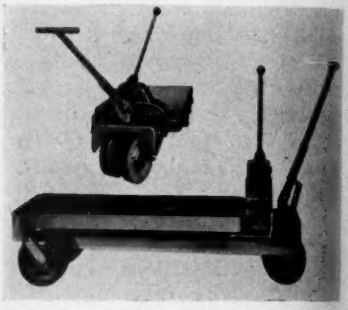
AUTOMATIC TRUCK BATTERY CHARGER

THE Hobart Brothers Company, division of the Motor Generator Corp., Troy, Ohio, announces a 3/4 KW fully automatic motor generator set. It is designed to be used on either lead-acid or nickel-iron types, and is designed for the modified constant voltage charging of one 6-cell 250 ampere hour battery in eight hours.

An automatic timer controls the starting and stopping during the pre-set charging time. The modified constant voltage generator controls the charging rate. A reverse current cutout automatically disconnects the battery in case of power failure, and re-connects it when the power returns, according to the company's release.

STANDARDIZED HYDRAULIC LIFT TRUCK

A STANDARDIZED lift truck, called "Load-Lift", has recently been developed by the product engineers of the Market Forge Company, Everett, Massachusetts. As stated by the company, the truck embodies several safety features which include an overload safety valve and a separate pulling handle from the lifting mechanism handle. The unit is equipped with sealed ball bearings in the wheels.



AIR-COOLED LADLE TRUNNIONS

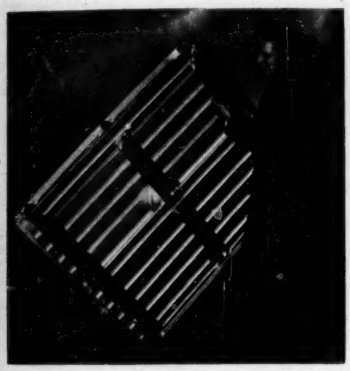
THE Whiting Corporation, Harvey, Illinois, announces a new all-welded ladle. Its trunnions are welded to channel-shaped members, permitting air circulation. The ladle is designed for safe and easy handling, without warpage and distortion. The tipping of the ladle, called "Pour-Rite", has been facilitated by a new style gear bracket which, through self-locking gearing, eliminates back lash, according to the release.

ALUMINUM PALLET

THE Reynolds Metals Co., Richmond, Va., announces a high-strength aluminum alloy pallet which will withstand loads up to 26,000 pounds, it is claimed. A rigid welded one-piece lower deck is securely riveted to the upper

deck through tubular load carrying members.

Standard sizes are available in 32" x 40", 42" x 50", 40" by 48",



and 48" x 48" units. These pallets are eight-way entry type, and steel straps can be used lengthwise as well as crosswise. The 40" x 48" pallet weight is given as 36 pounds.

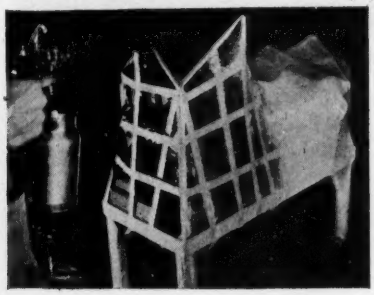
ADJUSTABLE WORK TABLE

TWO new all-adjustable "Work-Flow" tables have been developed by the Work-Flow Equipment Co., Pittsburgh, Pa. One is a "Tilt-Top Work Table", another a new drafting table. Both tables, states the company, are designed to provide utility and comfort for the table-top workman.

The adjustment is controlled by a small crank conveniently located at the front of the table, and the top is removable, permitting almost instant change from one operation to another, according to the news release.

SPRAY PACKAGE TECHNIQUE

TWO coating materials of the Saran family are announced by the Dow Chemical Co., Midland, Mich. Designated as Saran F-122 latex and F-120, a solvent soluble resin, the materials are used as



coatings for paper, fiber, textiles, metals, leather, films and foils. The coating materials are also said to be adaptable to the spray package technique. The accompanying photo shows an application in packaging a large assembly. This technique is employed in packaging equipment for extended storage or export shipment, according to the company.

CABLE CONVEYOR

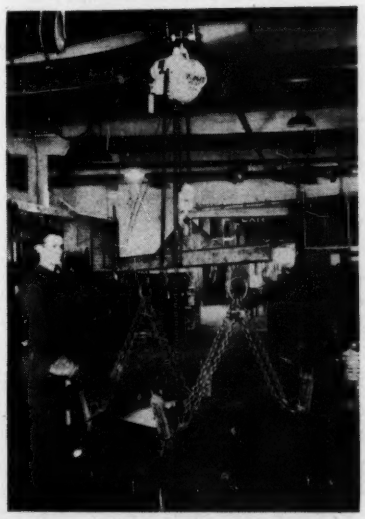
TRIANGLE Equipment Co., Inc., Chicago, announces a cable-way conveyor for overhead handling. The trolleys can be provided with trays, hooks, or other carrying devices. Standard sections require no welding or cutting on the job.

FORK TRUCK ATTACHMENT

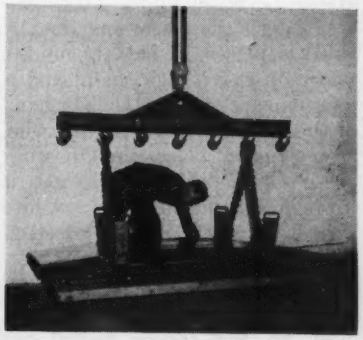
AN attachment developed by the Elwell-Parker Electric Co., Cleveland, is designed to convert fork trucks into articulated load carriers. One helper is recommended to guide the load at sharp turns. Other features of the design make the truck and attachment useful for a wide range of purposes, states the manufacturer. The attachment can be readily applied to any Elwell-Parker fork-type truck.

Cut Receiving Cost 65 Per Cent

The use of the overhead hoist shown in the accompanying photos has eliminated extra handling in this sheet steel



receiving operation. Before installation of this equipment, the arriving product had to be handled sheet by sheet. It was a laborious and time-consuming operation that involved several handlings. Now the entire lift is handled as one unit, which is picked



up directly from the truck body. (Note that the spreader bar is adjustable to sheets of various lengths.) The load is then lowered through a floor opening onto a dolly, which has been positioned adjacent to the storage area in the basement (second photo). Company representatives report that the new method has saved approximately 65 per cent of the former handling cost.—*Courtesy, Brunswick-Balke-Collender Co., Muskegon, Mich.*

Cone inspection supply conveyor in foreground, with salvage belt conveyor below. One supply conveyor to inspectors is shown at extreme left. Salvage conveyor table is in center of group.

TIMKEN KEEPS 'EM ROLLING

(Continued from page 24)

along the line of carriers, remove uninspected work from the upper trays onto the two lane roller table. From the latter the visual inspectors occasionally pull baskets into their basket troughs. They place the OK work into baskets on the L-shaped conveyors mentioned previously. Work from both inspectors of any group moves on this conveyor to the left hand of the taper gauging operator seated at the L-shaped table. This operator gauges the pieces and the OK work is placed in baskets on the table top at her right hand and is later moved 90° to the left hand of the O.D. gauging operator who, after gauging, places the OK work on a chute which discharges it through a demagnetizing coil into a basket placed on the low conveyor table before noted.

When any basket is filled the O.D. gauger places all rejected work on the carrier hooks and moves the basket of OK work onto the lower tray of one of the passing carriers.

The inspected product, both OK and rejected, moves past the OK checker's station where production cards are removed from OK baskets and the rejected material is removed from the hooks and, after reinspection, sorted into baskets of scrap or salvage. When salvage or scrap baskets are filled they are removed by a belt conveyor to the salvage department.

The OK work baskets remain on the monoveyor tray and move to a point at which they are transferred by an electro-pneumantic device to a conveyor successively carrying the baskets of OK cups through water wash, dryer, slusher and cooling operations and discharges these baskets on to a packing bench conveyor, where they are wrapped and boxed for shipment.

Heavy Boxes Easily Handled

The disposal of boxes of cups is made easy for the operators at this packing bench by means of a pivoted roller conveyor table upon which the boxes are first turned 90° and then moved on to a series of rollers located between the chains of a 3-strand chain take-away-conveyor. These latter rollers are movable at the will of the operator, to be positioned either above or below the chains of the chain conveyor, so that boxes moving from the pivoted table are carried over the moving chains of the chain conveyor and then deposited on to this conveyor by operation of an air valve. The boxes at this point, fully loaded, weigh as much as 700 pounds and are easily handled by a 90-pound operator.

The packing bench chain conveyor discharges loaded boxes by means of an electro-pneumatic gate onto a slat conveyor (which is used to transport boxes from the cone lines not yet described). They are then moved to a nailing and stenciling station. A description of this will follow in next month's concluding article.

Routing the Cones

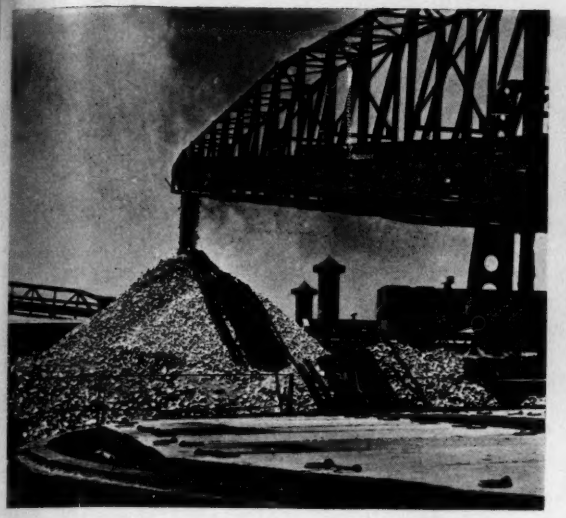
Containers of cones are discharged at the end of the cooling operation in the segregation area onto a roller table and are moved from there by an attendant to one of 3 U-shaped conveyors, adjacent the roller table. From here they are routed on one of the six conveyors formed by the legs of the U-shaped groups. Each leg has three inspection benches, so arranged that work may be moved from the conveyor to a tray at the left hand of each bench. These trays are inclined and at such a height that an inspector seated at the bench may easily remove individual cones. The take away conveyors from these inspector benches are located below the supply conveyors and are equipped with rollered branches about 20 inches high at the right of each bench so that OK work may be moved to the size gauging machines.

The rejected work is placed into baskets by a roving OK checker, and thence moved by means of gravity conveyors to a powered belt, which delivers it to the salvage department.

The OK cones at the size gauging machines are divided into minute differential classes for purposes of assembly and are placed in baskets for floor storage until they may be assembled. This is the only other point (besides the segregation area itself) at which the work is not on a conveyor for processing or assembly.

FREE SLING CALCULATOR

The determination of safe lifts is a constantly recurring problem for material handling. Now a handy sling calculator is available—Free—for determining the safe working load of every class of lift. Anyone can use it by following simple instructions. Write to FLOW for your free sling calculator.



View of circular track aboard ship. Light aluminum alloy boom prevents ship from listing.

This rubberized belt in tunnel at Wyandotte is part of system that moves stone from dockside bins to kilns that produce burned lime. The same underground conveyor system also transports coal from storage bins to point of use. Thus, in a relatively short time, huge loads of bulk materials can be transferred from ships to dockside bins and then to points of use within the plant.

A BULK HANDLING SYSTEM

(Continued from page 19)

carry the stone to the forward part of the ship. Here the material is delivered to another pan-type conveyor which inclines about 35 degrees and discharges into a gravity chute. The product is thus delivered to the type of unloading boom shown in several of the photos. The carrying surface of the boom is a 48-inch rubber belt, running on troughing rollers, with sufficient capacity to unload approximately 8,000 tons of stone in only about 5½ hours.

Each ship being equipped with its own unloading system, it is prepared to discharge its bulk cargo independently of shore gear at any port. This is particularly an advantage when the ships put in at smaller ports where adequate unloading facilities are lacking. This phase of the operation, not directly concerned with the stone handling, will be explained presently.

At the South Works in Wyandotte, the booms usually discharge the stone directly into the storage bins located near the kilns. From here the product is moved by underground belt conveyors to the kilns where the burned lime is prepared. Coal is similarly transferred from storage to the point of use by this underground conveyor installation.

As far as possible, the four ships of the company are operated on the two-way haul system. That is to say, on their return trip from Wyandotte to Alpena they are usually routed to pick up a cargo of coal for delivery at suitable points along their route of travel. This coal, as previously indicated, is sometimes delivered to out-of-the-way places where, by use of the unloading booms, the coal can be put "in practically any dealer's back yard."

Within recent weeks, the four ships of the Wyandotte Transportation Co., subsidiary of the Wyandotte Chemicals Corporation, have again started their annual runs on Lake Huron and adjacent Great Lakes. In a matter of hours, thousands of tons of limestone or coal are discharged, serving the needs of our company and other industrial plants along the Great Lakes by means of the seagoing conveying systems. The consequent short turnaround time enables us to make the most of the limited navigation season.

Mechanically Speaking

Certain features of the unloading system on the ships are of interest. The installation of pan conveyors in the hold of a freighter to convey limestone or coal to an elevator, and thence to a movable boom, was originated in 1908 by the company's retired Chief Engineer, George B. Palmer, then of the Michigan Alkali Co., which has since been incorporated into the Wyandotte Chemicals Corporation. While there is some variance in the length of the booms of the several ships, the overall length of the S/S Conneaut's boom is 225 feet. As the photo shows, no "A" frame is used. The overhang from the supporting structure is of aluminum alloy, which reduces the tendency of the ship to list when the boom is in an outboard position. The use of the aluminum alloy metal has also enabled the company to install longer booms on the ships, which is an advantage when unloading coal at the yards of dealers.

The same reciprocating engine raises and swings the boom by means of jaw type clutches. The pan, boom and belt conveyors are driven by leather belts with initial horse power transmitted to a line shaft by a turbine with reduction gears.

IN NEXT MONTH'S FLOW

Cargo handling is reduced as much as 75 per cent with modern methods . . . Interesting handling devices in the plant of a leading safety glass manufacturer . . . Exceptionally efficient operations in a heavy products industry . . . Straight line flow with right-angle space utilization . . . An exemplary operation in which many small parts are assembled at unusual layout stations . . . How a small plant solves a storage and manufacturing problem.

STOCK ANSWER

(Continued from page 20)

stock and miscellaneous storage. The floor, which consists of creosoted wood blocks, has unlimited capacity since it is built directly on the ground.

The rolls of paper are rolled out of the cars into one of four lateral aisles on the warehouse floor. The various stockpiles are built between these aisles. Here the rolls are lined up to be moved by the crane serving this half of the building. The type of roll carrier used, shown in the photos, handles four rolls at a time.

To accommodate rolls of different sizes, we use carriers of three different widths. These range from 27" to 77½", thus providing proper flexibility in moving a large tonnage of variously sized rolls into and out of storage. As the photos show, the carrier consists of a rectangular steel frame equipped with four pairs of chains, to the ends of which the plugs are attached.

As the rolls are being arranged in units of four each in the aisle, a checker notes the weight of each and inspects it for possible damage. The hookup man inserts the plugs and the crane moves the checked loads to the stockpiles. The crane operator, in turn, notifies the checker on the floor where the rolls have been stored (in what bay and section). This information is entered on the receiving check, and thus the office has complete information as to (a) roll number, (b) weight, (c) possible damage and (d) location of paper for each account.

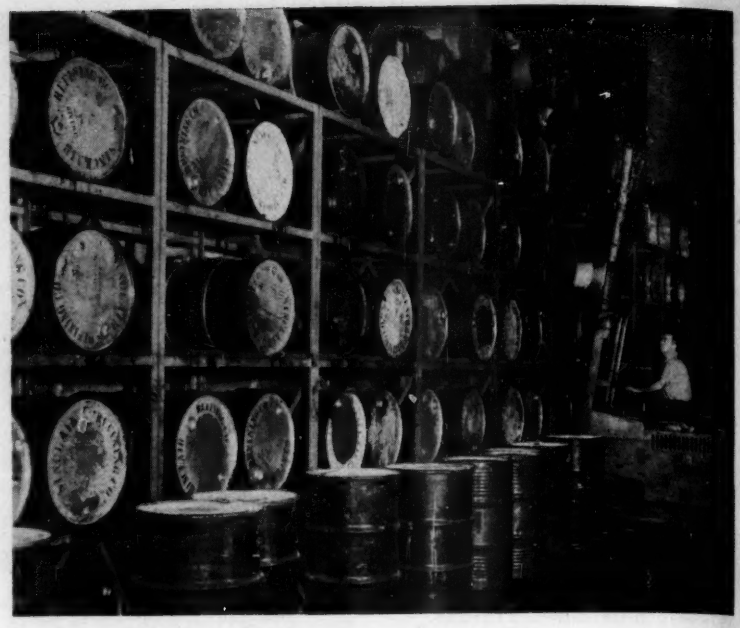
Our Warehouse Superintendent Dan McNamara takes pride in a detail of the car unloading operation which serves as a convenience for the men. This is a special "cold weather door" attached by means of hinges on the outside of each sliding door. When not in use, the two side wings are flat against the wall, and an upper or "roof" section is kept conveniently out of the way. These three sections of each "door" are of frame construction with a canvas covering. In cold weather the doors are "closed" toward the car and the top is lowered on the side panels, breaking the main force of cold blasts during zero and near-zero weather.

In passing, it might also be pointed out that a printer's paper warehouse differs in some respects from that of a newspaper. As a rule, a newspaper uses only relatively few kinds of paper. Consequently it can build large stockpiles of the same grade, and the individual piles are used up completely (usually according to age). Then a new stockpile is built in the area, with dunnage separating the individual layers of uniform rolls.

In our kind of operation, on the other hand, as many as 70 different kinds of paper may be running in the press room at one time. (These may be needed for the many forms of various catalogs as well as for scores of magazines.) To keep each kind in separate stockpiles would make impossible demands on space requirements.

Hence several kinds of paper are stored in each bay, and the individual rolls are nested as they are built to a height of 20 feet or more. With no dunnage used between the layers, as much as eight to 12 inches of vertical space is saved in each layer, and the nesting makes the rolls in the upper tiers self-blocking. The bottom row is held by blocks which are bolted to 3" x 6" stringers, extending the depth of the stockpile.

Thus each individual stockpile in a bay may contain three or four kinds of paper for as many different accounts, with each single section built to equal height and adjacent to each other. In this way the rolls of any stock are accessible to the crane from above. As a result, the material in any section can be moved when needed without disturbing the rolls in the adjoining sections.



Rack storage of drums of oil and ink saves valuable floor space, provides better stock control

Trucks Coordinated With Crane

As the press room requisitions the paper, it is moved from the stockpiles by crane, then by powered platform truck to the presses. The crane deposits the rolls in one of the four aisles mentioned previously. Two of the four rolls are placed directly on the truck platform, while the other two are lowered at the same time on a skid that is lined up with the platform of the truck. The truck operator delivers the first two rolls to the assigned press, then returns for the remaining two which are on the skid. These are simply rolled off on the truck platform, since the latter and the skid are on the same level. Meanwhile the crane has gone for another load, which is ready by the time the truck operator returns from his second trip. In this way the crane and truck are coordinated, with no waiting involved. While individual hauls to the presses may be 100 to 200 feet each way, incidentally, one truck serves without difficulty the entire press room, where scores

presses daily consume many miles of paper. As many as 500 to 600 rolls are thus handled per 24-hour day.

Flat Stock, Work in Process, Supplies

Due to the greatly increased volume of business, the cranes are practically working up to capacity around the clock, and our fleet of low-lift and high-lift platform trucks is relieving the cranes to a considerable extent. High-lift platform trucks, for example, move strapped skid loads of flat stock from receiving to storage. Here the material is double decked, and trucks will also move the work into production as needed.

Thousands of skid loads of signatures, printed forms awaiting binding, are similarly power handled. A skid platform is placed on the first half of a load, giving it firmness, and the load is then completed. Another skid platform, placed on top, makes the sizable units tierable. The loads are then double-decked in the temporary storage area in the basement. As can be seen from one of the photographs, the upper skid load is within a few inches of the ceiling.

Another phase concerns the handling of supplies, chiefly ink and oil in 55-gal. drums, of which several hundreds of units are consumed monthly. These barrels are now stored in angle iron racks, five high, with each barrel placed horizontally on a tray. These heavy barrels are easily racked and deracked by means of a fork lift truck. Smaller drums of 5-gal. capacity are palletized and handled by the fork truck in multi-unit loads into and out of storage.

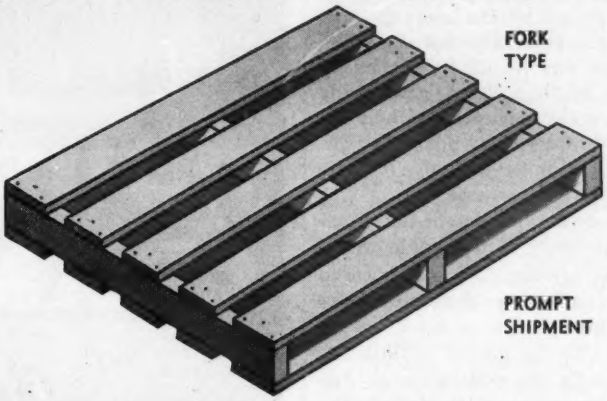
The rack system has enabled us to concentrate this important part of our supplies, and square footage has been saved by tiering the barrels. At the same time we have obtained a better control of the stock on hand, and housekeeping in this department has been considerably improved.

McNamara's Anecdote

In conclusion I would like to cite an anecdote told by Warehouse Superintendent Dan McNamara as a true experience of his younger days. Dan is of burly proportions, measuring over six feet, and in his youth used to set great store by muscu-

PALLETS

FORK TYPE • HAND LIFT • SLING TYPE • SKID



After building sling-type, fork-type and hand-lift pallets and skids for Uncle Sam throughout the war period, Industrial Pallet Co. is now serving industry. IPCO pallets are sturdy . . . of sound mixed hardwoods constructed with drive-screw nails, hand driven. They stand up under the most rigorous service.

Write today for further information. Our simplified order system enables you to fill in your specifications quickly.

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MATERIAL HANDLING COSTS REDUCED 30%!

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One TOTE-ALL user, handling broken salvaged glass, recently reported a 30% reduction in the cost of handling this material with his TOTE-ALL! Handling broken glass with this kind of efficiency indicates the ability of the TOTE-ALL Conveyor to handle other "easier-handled" products with even greater efficiency.

In addition to reducing material handling costs, TOTE-ALL Conveyors increase the efficiency of your manpower and save you time and equipment.

TOTE-ALL Bulk Conveyors handle material up to 14" top size such as sand, gravel, grain, coal, salt, glass, brick, clay, fertilizer, etc. Two lengths—14 ft. and 20 ft. Electric or gasoline power unit. With the TOTE-ALL Trail-Hoist, one man can easily move conveyor from one conveying job to another.

Descriptive bulletins available on TOTE-ALL Bulk Conveyors and TOTE-ALL Package Conveyors. Write for Bulletin W.

Tote-All

MATERIAL MOVEMENT INDUSTRIES
Formerly Coaltoter Conveyor Co. (Not Inc.)
310 S. Michigan Ave., Chicago 4, Ill.
PORTABLE POWER CONVEYORS

lar prowess. As he waited for some friends at a street corner one night, a large sedan limped to a stop at the curb with a flat tire. A wizened little man, a cripple, emerged from the automobile with a jack in his hand. But the car had dropped too low to permit him to insert the jack under the axle. By this time McNamara was joined by his husky friends, on their way to a wrestling match, and they decided to help the crippled motorist by lifting the car.

"We couldn't even budge it," McNamara tells you readily.

The driver pondered the situation a moment. Muttering he would find a remedy, he disappeared down a dark alley. A moment later he returned with a brick in his hand. This he placed against the wheel with the deflated tire, then drove the car cautiously on the brick. He now had ample room for the jack.

"From that experience I learned a lesson for the rest of my life," says McNamara. "Never try to do with your muscles what you can do by mechanical means."

SYSTEMATIC DIE STORAGE

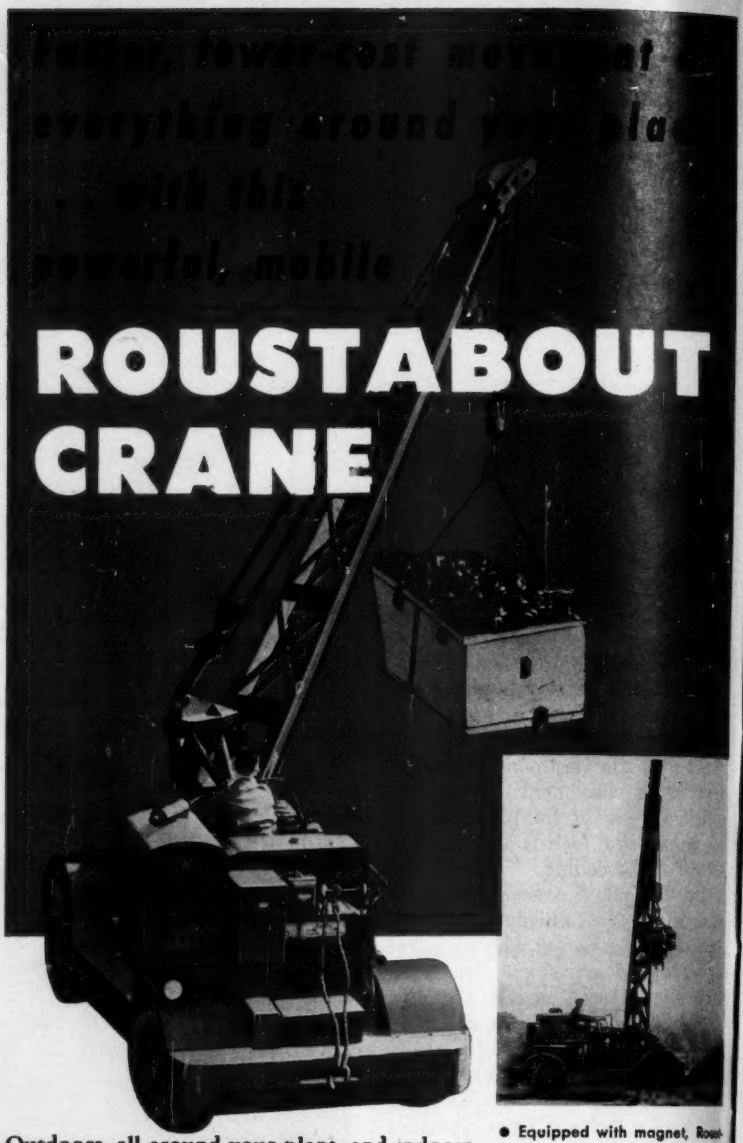
(Continued from page 50)

die, it is located instantly—and by anyone!

Our rack system also provides adequate protection for the expensive dies, both from the viewpoint of fire and of being "kicked around." With a specific location assigned to each unit, no die is placed on the other. This is important when you consider that the value of a single die may be several thousand dollars.

The present rack gives us better visibility than we had with the former wooden racks made of pieces of 2" x 12" lumber. A greatly improved appearance of the entire storage area is another advantage. And, since the dies are concentrated in a single area, all neatly shelved, greater accessibility is another factor. Too, the rigid metal rack structure also makes for greater safety. Finally, with the rack utilizing overhead space close within the ceiling, we are saving a considerable percentage of floor area formerly needed for die storage.

I believe these advantages speak for themselves.



Outdoors, all around your plant, and indoors when needed, the Roustabout does 101 jobs quickly inexpensively — saving costly delays, getting things done without taking crews from other work. It loads, unloads, shifts, stacks anything to 7½ tons. It's *where* you want it *when* you want it. Hundreds of users swear by its usefulness, its durability. Modernly engineered for years of overwork, ball-bearing boom turntable, all gears in oil. To bring yard efficiency up to plant level adds to your profits — and that's what Roustabout does. Write today for the whole story . . . it's worth money to you.

• Equipped with magnet, Roustabout handles scrap, ingots, etc.

• With grab-bucket, Roustabout hustles sand, cinders, etc.

THE HUGHES-KEENAN COMPANY
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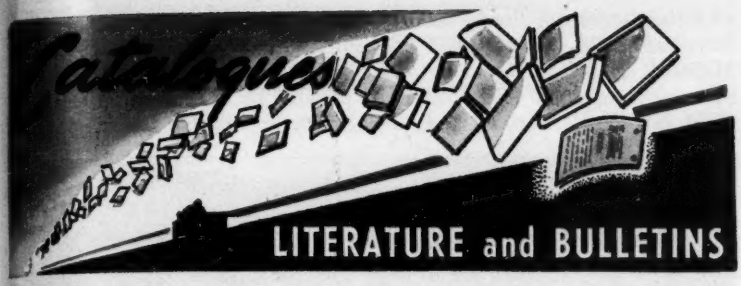
ROUSTABOUT CRANE

Roustabout Cranes
By Hughes-Keenan



The publications featured on these pages were written by experts. They are FREE publications. To obtain these use the postcard bound into this issue.

166—Electric Hoists . . . a 20-page bulletin by Electrolift Inc., which includes various uses and sizes of monorail hoists. Standard ratings and dimensions are given for monorail hoists, motor driven trolley monorail hoists, twin-hook monorail hoists, twin hook hatchway hoists, and two-speed A.C. hoists.

167—Tractors . . . an illustrated booklet published by Caterpillar Tractor Co. Numerous applications of the company's products are shown, including engineering and construction data.

168—Hand Trucks, Skids, Pallets . . . a 78-page catalogue illustrating the various hand trucks, skid platforms, and pallets made by the Yale & Towne Mfg. Co. Different applications for these products are shown along with a chart to aid in selecting the proper equipment for varied handling requirements. Specifications and sizes are charted for each model.

169—Lifters . . . a presentation by the Economy Engineering Co., illustrating various electric and hand lifters. This 32-page bulletin illustrates various applications under operating conditions. Construction details and mechanical data are included.

170—Diesel & Gasoline Locomotive Cranes . . . a 16-page catalog, No. 77, issued by the Orton Crane & Shovel Co. Construction and engineering details are illustrated and explained. Three charts give the models available along with their characteristics, which include normal lifting capacities at an operating radius of 10 to 120 feet.

171—Electric Trucks . . . an illustrated bulletin by the Moto-Truc Co., on the various applications and specifications of its electric hand trucks. Dimensions of each size are shown in chart form, with type and size of batteries required.

172—Wheel Conveyors, Hand Trucks . . . three bulletins offered by the Rapids-Standard Company, Inc. illustrating hand truck uses and specifications plus wheel conveyor adaptations. Accessories are also included.

173—Wire Rope . . . a 4-page bulletin by MacWhyte Co. on the development and uses of wire rope. Illustrated are various applications for wire rope in mining, loading dock handling, logging, etc.

174—Lifting Hook . . . a 4-page bulletin by Elizabeth Iron Works showing different uses of the "Diamond Torque Hook" in lifting various shapes of steel (beams, channels, etc.) Specifications are given for hooks, and size recommendations to handle beams, plates, and channels.

175—Push-pull Tractor . . . a 6-page publication offered by Automatic Manufacturing Co. on the uses and specifications of the new Transtractor. Complete data concerning its construction, drive unit, motor, braking system, drive control and steering mechanism are included.

176—Overhead Handling Equipment . . . a brochure containing eleven bulletins on chain hoists and overhead cranes issued by Conco Engineering Works. Specifications on capacity, span, clearances, etc., are listed.

177—Industrial Baskets . . . a 4-page bulletin offered by the Cambridge Wire Cloth Co. Various types of wire baskets and the uses of each are described, including cleaning, conveying, plating, degreasing, and other operations.

178—Tiering Racks, Pans . . . a 12-page bulletin, by Rack Engineering Co. It illustrates uses of metal racks for storing trays or pans containing work in process or storage. Tierable features and space requirements are fully described and explained.

179—Intercommunication Systems . . . Operadio Manufacturing Co. offers four bulletins on intercommunication units. Covered are models of various types for different plant requirements.

180—Overhead Conveyor . . . The Lamson Corporation offers a 20-page bulletin entitled "Utilize the Air Rights of Your Ceilings." Overhead chain conveyors are shown in production, storage, and shipping operations in various types of plants. Economy, convenience and space-saving features are stressed.

181—Metal Rail Cars . . . a booklet on Diesel metal rail cars, released by the Buda Company. This four-color 16-page publication illustrates models, construction features, seating capacities, and specifications of various chassis. It is available in English and Spanish.

182—Wire Pallets . . . a 4-page bulletin giving construction details and varied uses of wire pallets, by H. E. Fletcher Co. Model handling setups are shown to scale, with examples in storage and transportation applications.

183—Wood Handling Device . . . a bulletin by Drott Manufacturing Corp., illustrating the "Skid-Loader," a device for handling logs and similar material. Illustrations show actual handling in the forests, loading to trucks, etc.

184—Wire Rope Slings . . . John A. Roebling's Sons Co. offers a 70-page catalogue on wire ropes and slings. Formulas and charts are shown for figuring correct tension based on loads and headroom, including angles of inclination. Grommet bridle and cradle slings are illustrated in use with various types of loads suspended. A complete line of wire rope fittings which include eye hooks, thimbles, turnbuckles, splicing vises and other useful accessories.

185—Skids, Boxes, Pallets . . . The Union Metal Mfg. Co. offers a bulletin on steel skids, pallets, and skid and box units. Three types of skid boxes are shown which can be handled by platform lift truck, fork truck, or hand lift truck. Two of the types are castered. Two pallet designs are shown, each with modifications in design.

OPPORTUNITIES

Men wanted *Jobs wanted* *Lines available*

RATES: minimum, 25 words, $2.00; each additional word, 10c. Bold type or all capitals: minimum, 25 words, $3.00, additional words, 15c. All insertions are payable in advance.

LINES WANTED

Sales organization in New York City specializing in Material Handling Equipment. Warehousing facilities and Machine Shop for repair service. Desirous of adding one or two items to their line. Box 6147, FLOW.

SERVICE AVAILABLE

Chicago-Midwest, Sales and Engineers services available to Manufacturers, Conveyors and Allied equipment. Qualified to process your product for correct industrial application. Box 6146, Flow.

JOBS WANTED

Graduate Chemical Engineer (Master's 1935) ten years broad progressive engineering experience including 2½ years in materials handling, palletizing and packaging. Send reply to Box 303, Edgewood, Md.

FORD ADDS SPEED

(Continued from page 35)

Serving River Rouge Production Needs

As previously indicated, the unit load system is also being extended within the parent plant wherever the product is adaptable. A suitable illustration is the use of bin boxes which are used for press parts, forgings and small castings. The power handling of these units is saving hundreds of hours monthly for vital production needs. Previously these items were handled in individual drums from receiving to storage, and from building to building.

The use of the tierable bins has also resulted in a considerable saving in floor area. They are stacked four high where the headroom permits. The capacity of four bins is equal to the capacity of 11 drums. The tiered bins require 11 square feet of floor space as against 32 square feet required for 11 drums —a saving of almost 66 per cent of floor area. When the bins are loaded with lighter materials, one pallet hand lift truck can move two stacked units at a time—the equivalent of 5½ drums.

The new method also permits safe handling by means of powered trucks, as well as neatness in warehousing. Too, inventory control is simplified by the use of graduated marks painted on the outside of the containers. This greatly speeds the piece count which is periodically made for the stock status report.

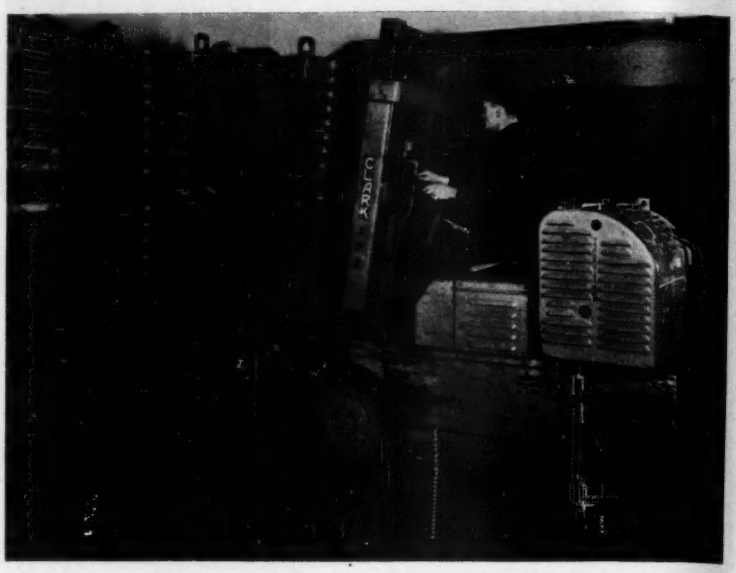
The above is but one example among a great many which could be cited at River Rouge. Numerous other types of materials—whether for production or service needs —are handled as units. Thus, fire brick—to cite one more example—is received in cars and palletized at the car doors. In this case the unit load method has saved four handlings that were previously necessary.

Savings Must Be Engineered

The conversion to unit loads has a good many ramifications which, while not specifically mentioned so far, are apparent to the material handling engineer. Adoption of the program naturally required a revision of layouts in order to provide ample space for fork truck traffic. (Tractor-trains will also be used to serve assembly operations.) The Material Planning Division goes over all layouts affected with the plant layout department and the stock superintendents of the various buildings concerned. This phase of the program also includes rearrangement of floor areas for adequate warehouse space in locations where pallet-bearing tractor-trains will serve assembly lines, or where such trains will move in-process material. The program also calls for additional loading dock facilities in order to take full advantage of the unit load method in the numerous buildings at River Rouge.

Meantime, the Material Planning Division and its experimental department are leaving no possibility unexplored to provide the maximum savings along with the most suitable package for every type of product handled. Pallets constructed of various materials are being tested, and extensive use is being made of steel pallets.

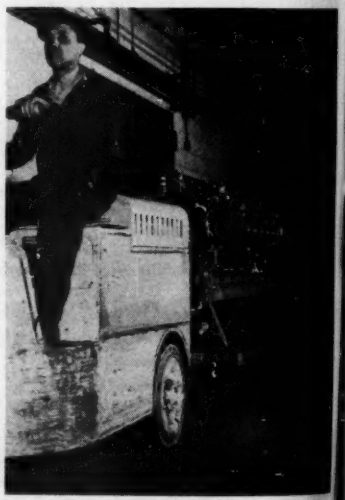
The examples cited in this "progress report" are a few among a great many. But they are typical of what is being accomplished with the unit load method at River Rouge. The modernization program received its impetus from the wartime experience at Willow Run, where Ford production men applied mass production techniques to the B-24. Here, overhead and other fixed conveying devices were extensively coordinated with the pallet-and-fork-truck method. Receiving and storage were served wherever possible by use of unit loads, and wherever feasible arriving pallet loads were delivered directly to assembly lines. Thus the system that helped beat the Axis is now adding speed to the mass production of Ford automobiles in peacetime.



Bin boxes are replacing drums at River Rouge. These tierable bins illustrate space-saving feature. Article explains how they save about 66% of floor area.

Special Carrier for Motor

This industrial tractor is hauling a heavy marine motor to a testing cell. The carrier was especially designed for moving marine-type motors like the one shown. The carrier has wheel-and-axle support in the rear, casters in front. The casters give the carrier the desired maneuverability. They allow the tractor to make short turns.—*Courtesy, Packard Motor Car Co.*



ON THE PALLET

(Continued from page 26)

where almost any quality can be imparted to a package. It can be made proof against vapor, moisture, grease, heat, cold, insects, air, light, and deteriorating agents. Long familiar materials, such as asphalt and wax, also have played a role through novel applications; adhesives had to be developed to perform almost the impossible. Nor is the revolution restricted to flexible packaging—significant advances have been made in metal, glass, and wooden packages.

Prepackaging of certain items, particularly processed foods, probably received its impetus from the war. The postwar demand for such products has probably been considerably augmented by higher consumer spending power, increased use of certain products, growth in population, and the participation of new consumers initiated by military service and rationing.

The future of electrolytic tin plates is certain, but the fruits of the work in lacquers constitue a permanent contribution to the art of packaging.—From an article by Morris Moses, General Products Section, Office of Domestic Commerce.

ONE of the most modern and completely equipped battery laboratories was formally opened on April 16 and 17 at Depew, N. Y., by the National Battery Company. J. L. Rupp, vice president in charge of engineering, directs the laboratory operations. He is assisted by M. W. Dickover, assistant chief engineer. The research activities are under the direction of Dr. Eugene Willihnganz. He joined the engineering staff of the National Battery Co. in 1945.

The greater portion of the floor space of the laboratory is devoted to the preparation and testing of experimental batteries. Numerous types of equipment are also provided for a wide variety of testing purposes. A part of the laboratory is a small pilot plant in which experimental batteries will be made by production methods. A chemical department is provided for chemical analyses of grid metal, oxides, active material, electrolyte and separators. Special instruments are also installed, among them: An X-ray diffraction unit, a spectroscope and several kinds of specialized microscopes.

The purpose of the extensive and completely equipped laboratory is to conduct lead acid storage battery research work and testing, and to develop the scientific aspects of storage battery manufacture.

IN A recent talk, Charles F. Kells commented that "these are days when management is faced with a "cut cost or bust" alternative. Work simplification—better methods, mechanization of material flow, in the sense that it has been applied to tools and processes—is overdue. Mechanical handling is an extremely broad subject. It is found in industry in every form, from hand lift trucks to power conveyors, overhead cranes and gravity chutes. Industrial truck systems make it possible by their self-loading characteristics and with floors as their only permanently fixed relation to the plant to give low installation and operating cost and complete adaptability to any changes of production layout.—Chas. F. Kells, Director of Educational Program, Electric Industrial Truck Ass'n.

THE appointment of new committees to guide the affairs of the Wirebound Box Manufacturers Association for the next year has been announced by President R. F. Miles.

The materials research committee, which is seeking a substitute material to supplement the veneer now used in wirebound boxes in anticipation of continued shortages, will be headed by W. C. Embry of the General Box Company.

Other committe chairmanships announced by Miles included H. C. Bullard, Chicago Mill and Lumber Company, market research committee; George T. Walne, General Box Company, sales promotion committee; R. J. Byers, Chicago Mill and Lumber Company, design, specifications and quality committee; D. F. Hahn, General Box Company, manufacturing equipment committee; E. E. Johnson, Rathborne, Hair and Ridgway Company, sales training committee; J. A. Sowell, T. R. Miller Mill Company, cost committee; and N. W. Embry, General Box Company, statistics committee.

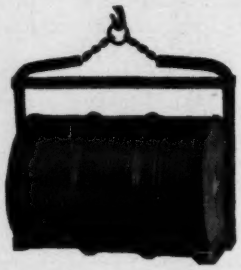
THE John A. Roebling's Sons Company of Illinois announced work is already underway for the erection of a modern office building and warehouse, located at 5525 West Roosevelt Road, Chicago. The structure is designed and located to facilitate material handling and expedite customer service.

The STEELBINDER strapping tool places no wedge or lip underneath the strap. Consequently, the strap stays tight, is not loosened, as you disengage the STEELBINDER. No need to overtighten. Binds all sizes and shapes, and is the only tool that ties with 3/8", 1/2", 5/8" and 3/4" wide steel strap of up to .028" thickness. Cuts off the strap automatically after tensioning. Light, compact, fast, it's the right tool for all but heaviest duty jobs. For heavy duty strapping of .035" thickness, use the A. J. Gerrard BULKBINDER.

A. J. GERRARD & CO.

221 North LaSalle Street, Chicago 1, Illinois 5-A

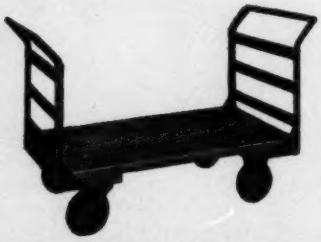
The Line That Binds, Braces and Fastens Everything You Ship



Item B-416
$27.50

Barrel Cradle—*Toggle Type*

Use for picking up barrel or drum, straight or bilged sides, flat or chimed ends. Especially designed for picking up barrels and plywood or fiber drums without chimes (flush ends). Handles barrels 20" to 25" in diameter and 32" to 36" in length. Also used for handling rolls of paper, carpeting, or anything that is cylindrical in shape. Capacity 1000 lbs. Special sizes quoted on application. Heavy bar stock, welded construction. Air dry, enamel finish. Weight 45 lbs.

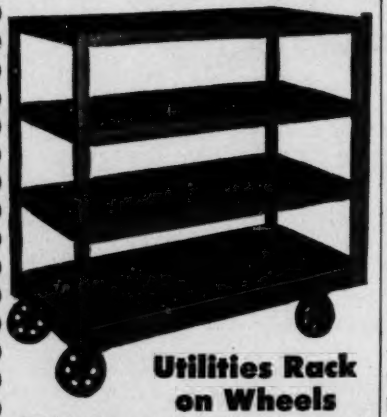


Double End Truck

General purpose push truck, with hardwood platform 52" long by 27" wide. End racks are steel, with push handles 36" from floor. Four 6" x 2" metal caster wheels—two swivel, two rigid. Air dry, enamel finish.

Item X-114-M (Metal Wheels) $41.25

Item X-114-R (Rubber Tired Wheels) $48.40



Utilities Rack on Wheels

For handling parts or small items in course of production or assembly. Use at machine and also for conveying materials from place to place. All steel, welded construction. Width 24", height 50", length 48" overall. Clearance between shelves 12". Four 6" roller bearing casters, two of which are rigid and two swivel. Weight 220 lbs. Air dry enamel finish.

Item NS-415-M $55.50
(Roller bearing, 6" x 2", all metal wheels)

Item NS-415-R $57.50
Ball bearing, 8" x 1¾" rubber tired wheels.

Barrel Truck
Loads Automatically

Handles with ease barrels weighing up to 1,000 lbs. Weighs but 85 lbs. To load, shove truck up against barrel or drum, then drop sliding steel catch over rim . . . pull toward you and truck loads automatically without rocking or tugging—loads from row as easily as when barrel stands alone.

Sturdily constructed of heavy steel, two 10" roller bearing wheels. Greatest width only 22", permitting it to pass through aisles and doors too narrow for many trucks.

Item S-911-M $33.50
Equipped with metal wheels

Item S-911-R $38.50
Equipped with molded-on rubber wheels

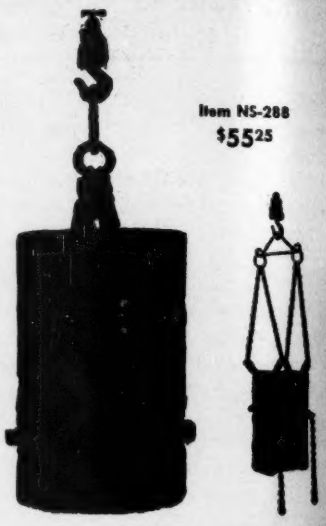
Sliding catch grips until released by operator; note long hook for bilge type barrel.

Item S-703
$17.50

Industrial Dust Pan

No shovel to bother with. Moves around in places too tight for a wheel-barrow. Very light to handle. Weighs only 45 lbs. Capacity one bushel. Exceptionally well constructed to withstand rough treatment in industrial plants.

The pan or metal basket which measures 18" x 18" x 18" is made of 16 gauge sheet steel, the frame of 1" x 1½" x ⅛" angle iron, the handle of 1" tubing, all welded construction. The overall height is 48". Two 8" rubber tired, ball bearing wheels.



Item NS-288
$55.25

Barrel—Box Grab

For picking up any type of wood or steel barrel, box or container measuring from 40" diameter down to small nail keg size. Will lift up to 2000 lbs. Rigid toggle construction, with heavy welded steel chains and tongs made of heavy bar stock. Weight 35 lbs.

Wooden Boxes
Metal Bound

May be used as a push truck or with lift truck. Built of all hardwood, all welded construction, no bolts used. Four sturdy, 5" swivel casters. Metal parts are air dry enamel finish, wood left natural.

TWO SIZES

Item NS-418-A $32.45
This item is 24" wide, 36" long, 26" high overall. Weight 185 lbs.

Item NS-418-B $36.85
This item is 28" wide, 48" long, 30" high overall. Weight 260 lbs.

We design and build all types of trucks, skids, pallets, platforms, racks, boxes, bins, and tables . . . for pick-up, loading, moving, shipping, dumping, and storage.

When ordering: Always use "Item" number; it will help prevent error. All weights given are approximate.

All prices f.o.b. Detroit. Prices subject to change without notice.

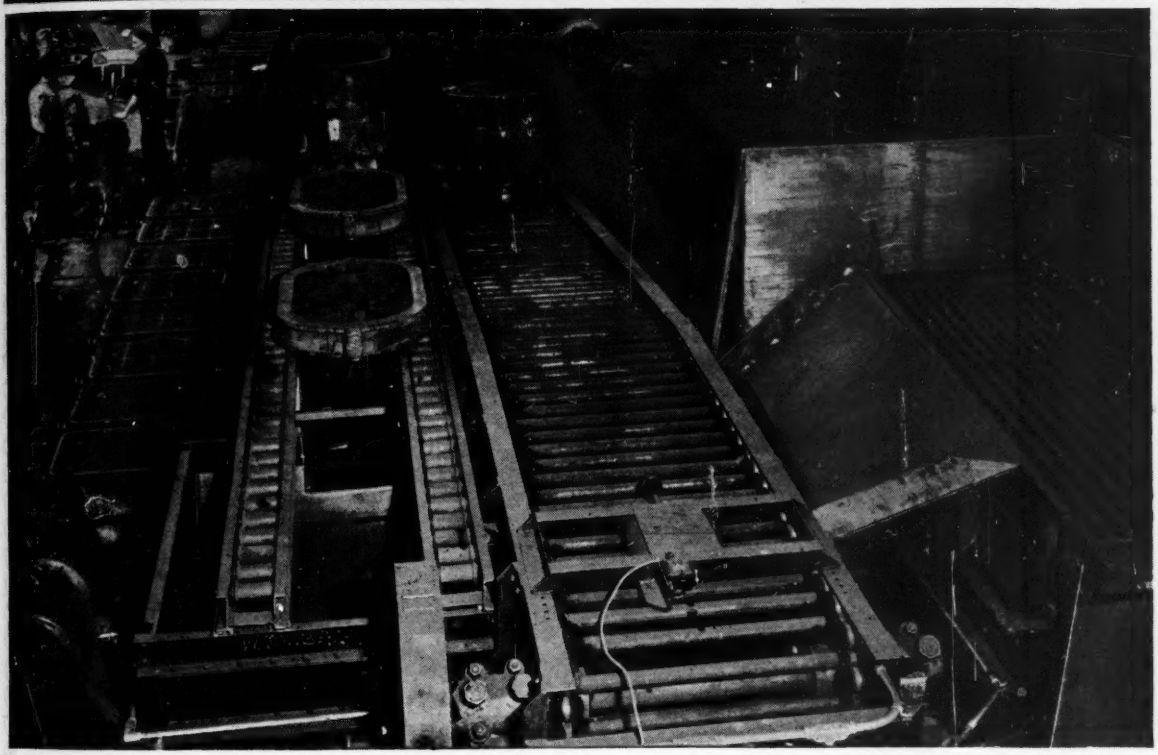
Palmer-Shile Co.

7170 West Jefferson Ave., DETROIT 17, MICH.

Mathews

CHAIN CONVEYERS

Engineered to serve Production



For heavy-duty work, such as illustrated above, where power conveyers are required, the pallet type Chain Conveyer is one of the most practical. It is capable of handling very heavy loads at carefully controlled speeds. The many different types of pallets available add to the flexibility of conveyers of this type. They can be of steel or wood, and can be spaced at various intervals in the chain, or can be interlocking. There is a Mathews Engineer operating in your vicinity. Ask him about Mathews Chain Conveyers, and the many other types of Mathews Foundry Conveyers which have been engineered to serve production

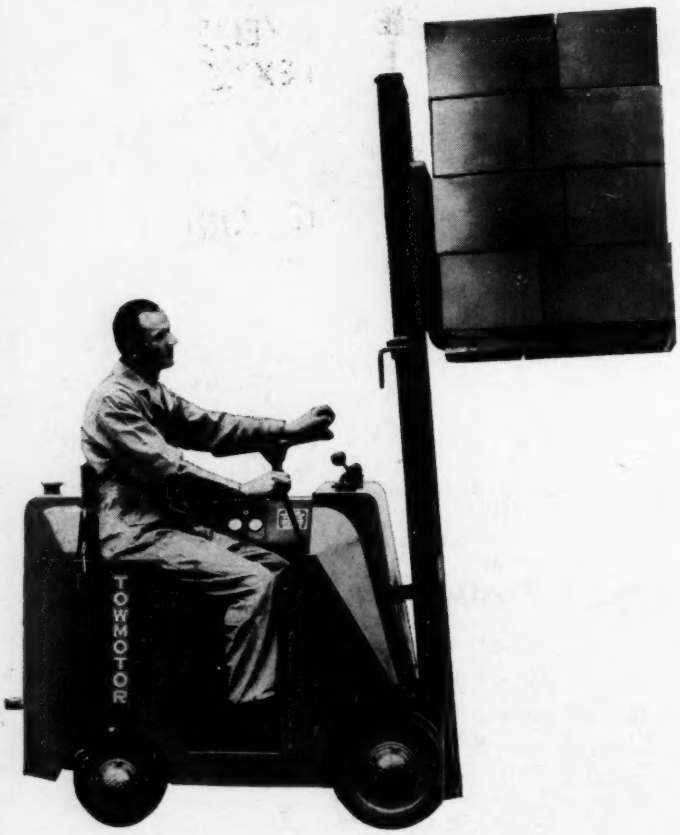
Mathews Conveyer Company

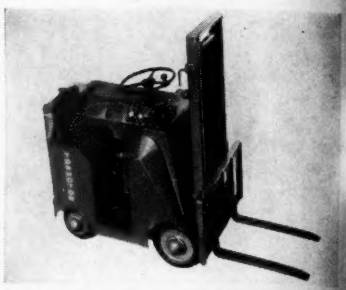
ELLWOOD CITY, PENNSYLVANIA

Announcing . . .

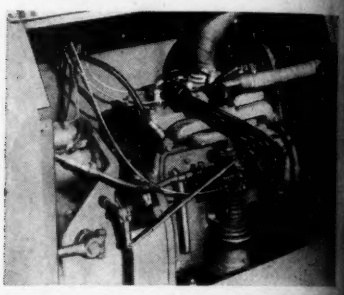
The New TOWMOTOR *LT-35 LIFT TRUCK*

Compact and lightweight---makes it economically sound for every industry, regardless of size, to enjoy the advantages of modern, mechanized materials handling.





Unique design provides plenty of clear, accessible space for the operator while retaining small overall dimensions and low center of gravity for maximum stability.



Engine and transmission in the LT-35 are easily accessible for inspection, adjustment and maintenance.

The new Towmotor LT-35 Lift Truck can lift, carry and stack 1500 to 2000 pound loads with ease, yet it is so compact and lightweight that it may, with utmost safety, be operated under full load on freight elevators of limited capacity, on upper floor levels where low load limits are imposed, or directly into motor trucks.

Because of its size and ability to operate in confined areas, the LT-35 makes it economically sound to provide mechanical handling on jobs where manual handling, with its excessive labor costs, was formerly the only available method. The small, agile LT-35 can save time, money and manpower on your operation by taking over countless handling tasks, accomplishing them in less time, with far less effort and at lower cost.

The new LT-35 is the smallest of the complete line of Towmotor Lift Trucks and Tractors, each a product of the experience and "know-how" that Towmotor has gained in solving handling problems in every industry. Send for your copy of the Towmotor Lift Truck ANALYSIS GUIDE today. Towmotor Corporation, Div. 12, 1226 East 152nd Street, Cleveland 10, Ohio.

TAKE IT UP WITH

TOWMOTOR

THE ONE-MAN-GANG

12 ★ FEATURES

- ★ COMPACT
- ★ LOW STEP UP TO OPERATOR'S STATION
- ★ LIGHTWEIGHT
- ★ RUGGED CONSTRUCTION
- ★ MANEUVERABLE
- ★ 4-WHEEL STABILITY
- ★ AMPLE SPACE FOR OPERATOR
- ★ EASY REACH CONTROLS
- ★ HYDRAULIC LIFTING AND TILTING MECHANISMS
- ★ MAXIMUM ACCESSIBILITY FOR INSPECTION AND MAINTENANCE
- ★ SHORT TURNING RADIUS
- ★ ENGINEERED TO THE JOB BY TOWMOTOR